Department of Electrical Engineering

POs

PROGRAM OUTCOMES (POs)

PO1: Engineering knowledge -Ability to apply the knowledge of mathematics, physical sciences and computer science and engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis -Ability to identify, formulate and analyze complex real life problems in order to provide meaningful solutions by applying knowledge acquired in computer science and engineering.

PO3: Design-development of solutions -Ability to design cost effective software - hardware solutions to meet desired needs of customers-clients.

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 in the field of computer science and engineering.

PO5: Modern tool usage -Create, select and apply appropriate techniques, resources and modern computer science and engineering 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.

PSOs

PROGRAM SPECIFIC OBJECTIVES (PSOs)

PSO1: To explore the ideas, methodologies and **cutting-edge technologies** in **Renewable Energy** and **Electric Vehicles** for gaining competence to solve energy related problems.

PSO2: To analyze, design and provide an **engineering solution applying knowledge** of Embedded System, Smart Grid, Power Electronics and Electric Drives.

PSO3: To use **modern software tools** for simulation, analysis and designing electrical and electronic Systems.

COURSE OUTCOMES OF R (16)

Subject: Mathematics-I
Subject Code: M 101

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the distinctive characteristics of matrix algebra, differential calculus, integral calculus and vector analysis.
CO2: Understand the theoretical working of matrix algebra, differential calculus, integral calculus and vector analysis.
CO3: Apply the principles matrix algebra, differential calculus, integral calculus and vector analysis for the solutions of the problems.

CO4: Analyze the application of matrix algebra, differential calculus, integral calculus and vector analysis.

CO5: Evaluate the result for application to the problems on matrix algebra, differential calculus, integral calculus and vector analysis

Subject: Chemistry 1
Subject Code: CH 101

Course Outcomes (COs):

CO1: Able to remember fundamental concepts of Chemistry and define relevant terminologies.

CO2: Able to understand the principles of thermodynamics, spectroscopy and related physical properties of molecules.

CO3: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries and technical fields.

CO4: Able to analyze and explain protective measures of corrosion of metals in the industries.

CO5: Able to assess theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

Course Name: Basic Electrical Engineering
Course Code: EE 101

Course Outcome (COs):

After completion of the course students able to

CO1: Understand Basic Electrical circuits, Power distribution and Safety measures.

CO2: Analyze an apply DC network theorems.

CO3: Analyze and apply concept of AC circuits of single-phase and three-phase.

CO4: Understand basic principles of Transformers and Rotating Machines.

Course Name: Communicative English
Course Code: HU101

Course Outcomes (COs):

By doing this course the students will be enabled to do the following:

CO1: Able to define, identify and describe the basics of communication theory and its application.

CO2: Able to recognize, recall and make use of English vocabulary and its varied usage.

CO3: Able to develop and apply reading and writing skills in an academic and global business context.

CO4: Able to identify, explain and use the grammatical structures and forms in English.

CO5: Able to analyse, classify and elaborate on the forms and formats of business writing.

Paper Name: Engineering Mechanics
Paper Code: ME 101

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

CO2: Study the effect of friction in static and dynamic conditions.

CO3: Understand the different surface properties, property of masses and material properties.
CO4: Analyze and solve different problems of kinematics and kinetics.

Paper Name: Language Laboratory and Seminar
Paper Code: HU191

Course Outcomes (COs):

CO1: Listen to and summarize, interpret and explain audio material/data in English.

CO2: Understand and implement the basics of note taking of factual data/information in English and keep a laboratory record.

CO3: Engage in spoken interaction using needs specific vocabulary, language function and pronunciation in conversations, role plays and group discussions.

CO4: Maintain and keep a listening log and write a film review.

Paper Name: Chemistry – I Laboratory
Paper Code: CH 191

Course Outcome:

CO1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CO2: Able to work as an individual also as an team member.

CO3: Able to analyse different parameters of water considering environmental issues

CO4: Able to synthesize nano and polymer materials.

CO5: Capable to design innovative experiments applying the fundamentals of chemistry.

Course Name: Basic Electrical Engineering
LaboratoryCourse Code: EE 191

Course Outcome:

CO1: Identify and use common electrical components.

CO2: To develop electrical networks by physical connection of various components andanalyze the circuit behavior.

CO3: Apply and analyze the operational characteristics of electrical machines.

CO4: Apply and analyze the equivalent parameters, Losses, efficiency of transformers.

Paper Name: Engineering Drawing and Graphics
Paper Code: ME 191

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

CO1: Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

CO2: Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

CO3: Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

CO4: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

Subject: Mathematics II
Subject Code: M 201

Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the distinctive characteristics of improper integral, Laplace Transform, ordinary differential equation, graph theory.
CO2: Understand the theoretical working ofimproper integral, Laplace Transform, ordinary differential equation, graph theory.
CO3: Apply the principles of improper integral, Laplace Transform, ordinary differential equation, graph theory.
CO4: Analyze the application of improper integral, Laplace Transform, ordinary differential equation, graph theory.
CO5: Evaluate the result for application to the problems on improper integral, Laplace Transform, ordinary differential equation, graph theory.
CO6: Design graph to solve different real life problems.

Paper Name: Physics – I
Paper Code: PH 201

CO1: Describe various types mechanical resonance and its electrical equivalence
CO2: Explain basic principles of Laser, Optical fibers and various types of semiconductors
CO3: Apply superposition to explain interference and diffraction as well as apply wave mechanics for attainment of Heisenberg's uncertainty principle
CO4: Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors
CO5: Justify the need of quantum mechanics as remedy to overcome limitations imposed by classical physics

Course Name: Basic Electronics Engineering

Code: ECE 201

Course Outcome:

CO1: Understand the PN junction diode, ideal diode, diode models and its circuit analysis, Remember the application of diodes and special diodes.

CO2: Analyse how operational amplifiers are modelled and analysed, and to design Op-Amp circuits to perform operations such as integration differentiation on electronic signals.

CO3: Assess both positive and negative feedback in electronic circuits.

CO4: Develop the capability to analyse and design simple circuits containing non-liner elements such as transistors using the concepts of load lines, operating points and incremental analysis.

Course Name: Computer Fundamentals & Principle of Computer Programming
Code: CS 201

Course Outcome:

CO1: To identify the working principle of input and output devices of Computers memorize the basic terminology used in computer programming
CO2: To express programs in C language and use different data types for writing the programs
CO3: To implement programs using the dynamic behavior of memory by the use of pointers
CO4: To explain the difference between call by value and call by address
CO5: To write programs using basic data files and developing applications for real world problems.

Course Name: Engineering Thermodynamics & Fluid Mechanics
ME 201

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

CO2: Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
CO 3: Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
CO4: Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

Paper Name: Physics – I Laboratory
Paper Code: PH 291

Course Outcomes:
At the end of the course students' should have the

CO1 : Demonstrate experiments allied to their theoretical concepts
CO2 : Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spctrometer
CO3 : Participate as an individual, and as a member or leader in groups in laboratory sessions actively
CO4 : Analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments

Paper Name: Basic Electronics Engineering Laboratory
Paper Code: EC 291

Course Outcome:
CO1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
CO2:. Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
CO3: Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
CO4: Able to know the application of Diode, BJT &OPAMP.
CO5: Familiarization and basic knowledge of Integrated Circuits

Workshop Practice
Code: ME 292

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:
CO1: Gain basic knowledge of Workshop Practice and Safety useful for our daily living.
CO2: Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and

performing operations like such as Marking, Cutting etc used in manufacturing processes.
CO 3: Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.
CO4: Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

Paper Name: Computer Fundamentals & Principle of Computer Programming Lab
Paper Code: CS291

Course Outcome:

CO1: To identify the working of different operating systems like DOS, Windows, Linux

CO2:. To express programs in C language

CO3:. To implement programs connecting decision structures, loops

CO4: To experiment with user defined functions to solve real time problems

CO5: To write C programs using Pointers to access arrays, strings, functions, structures and files.

Paper Name: Mathematics – III
Paper Code: M301
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to
CO1 : Recall the distinctive characteristics of matrix algebra and calculus.
CO2: Understand the theoretical working of matrix algebra and calculus.
CO3: Apply the principles of matrix algebra and calculus to address problems in their disciplines.
CO4: Examine the nature of system using the concept of matrix algebra and calculus.

Paper Name: Digital Electronics
Paper Code: EC (EE) 301
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to

CO1: Acquired knowledge about solving problems related to number systems conversions and Boolean algebra and design logic circuits using logic gates to their simplest forms using De Morgan's Theorems; Karnaugh Maps.

CO2: Design of combinational circuits

CO3: Design of various synchronous and asynchronous sequential circuits using State Diagrams & Tables.

CO4: Understand DAC & ADC technique and corresponding circuits

CO5: Analyze logic family interfaces, switching circuits & memory storage devices to Plan and execute projects.

Paper Name: Analog Electronic Circuits
Paper Code: EC(EE) 302
Course Outcome: After the completion of course, student will be understand

CO1: Understand linear and nonlinear applications of OPAMP
CO2: Understand effects of different feedback mechanism in amplifier circuit.
CO3: Analyze transistor amplifier circuit.
CO4: Student will be able to design power amplifier circuit.

Paper Name: Circuit Theory and Network
Paper Code: EE301
Course Outcome:

CO1: Understand the basic concepts of electric, magnetic and filter circuits.
CO2: Synthesize different electrical circuits with network theorems.
CO3: Analyze the transient condition of electrical circuits.
CO4: Analyze two port circuit behaviors.

Paper Name: Field Theory
Paper Code: EE302
Course Outcome:
CO1: Know the orthogonal co-ordinates and their transformation to solve & analyze problems on vector calculus.
CO2: Know the basic laws of electrostatics and electromagnetism and define associated terms.
CO3: Understand Maxwell's equation in different forms.
CO4: Understand the propagation of EM waves associated with different Electrical Networks.

Paper Name: Thermal Power Engineering
Paper Code: ME(EE) 301
Course Outcome: Upon successful completion of this course, the student will be able to
CO1: Get detailed knowledge on the working principle of mountings and accessories of fire tube and water tube boilers.
CO2: Understand draught systems and carry out heat balance of a power plant to evaluate efficiency.
CO3: Analyze the working of steam nozzles and variety of turbines to carry out design based project works and solution of industrial problems
CO4: Evaluate the performance of I.C Engines and Gas turbines.

Paper Name: Analog and Digital Electronics Laboratory
Paper Code: EC(EE) 391

Course Outcome:
CO1: Able to understand, analyse the analog circuits pertaining to applications like amplifier, oscillators and timer, interfacing digital circuits with ADC & DAC.
CO2: Able to understand the fundamental concepts and techniques used in digital electronics.
CO3: Examine the structure of various number systems, De- Morgan's law, Boolean algebra and its application in digital design.
CO4: Analyse the analog circuits pertaining to applications like amplifier, oscillators and timer.

Paper Name: Circuit Theory and Network Laboratory
Paper Code: EE391
Course Outcome: After the successful completion of the course, student will be able to
CO1: Demonstrate transient analysis of electric circuits
CO2: Analysis of frequency response characteristics of Filter circuits.
CO3: Analyze signals using mathematical tools/ software
CO4: Determination of parameter of different kinds of Electrical Networks

Paper Name: Thermal Power Engineering Laboratory
Paper Code: ME (EE) 391
Course Outcome: Upon successful completion of this course, the student will be able to
CO1: Understand operations of different type of Boilers, their mountings and accessories.
CO2: Evaluate the performance of a four stroke engine with varying load and speed.
CO3: Carry out the heat balance of an I C Engine for design and development of solution.
CO4: Determine calorific value of a fuel useful for future project works.

Paper Name: Technical Report Writing and Language Practice
Paper Code: HU 381
Course Outcome: By the end of the course the student should be able to
CO1: Understand and make use of a wide taxonomy of listening skills & sub-skills for comprehending & interpreting data in English
CO2: Speak in English, using appropriate vocabulary and pronunciation in contextualized situations
CO3: Understand and put into effective practice the pragmatics of Group Discussion
CO4: Understand and write a detailed technical report as per organizational needs
CO5: Understand and interact in professional presentations and interviews

Paper Name: Physics – II
Paper Code: PH (EE) 401
Course Outcome: After completion of this course student will be able to

CO1. Explain electron transport in metal-insulators and semiconductors using energy Band theory.

CO2. Apply Schrödinger equation in variety of atomic scale problems including nanomaterials.

CO3. Analyze the physics of various kinds of electric and magnetic materials

CO4. Justify the importance of Fermi energy level in turning electronic properties of various materials

Paper Name: Electrical Machines I
Paper Code: EE 401
Course Outcome:
CO1: Describe the concept of magnetic circuits.

CO2: Demonstrate the operation of different types of dc machines and its applications.

CO3: Understand the equivalent circuit of Transformers, D.C. Machines, and Three-Phase Induction Motor.

CO4: Analyse the connections of transformers and its operations.

Paper Name: Electrical and Electronics Measurement
Paper Code: EE402
Course Outcome:
CO1: Understand the operating principles of electrical and electronic measuring instruments.
CO2: Understand the functions of different Sensors and Transducers
CO3: Identify and measure various physical parameters using appropriate measuring instruments.
CO4: Application of Current Transformer and Potential transformer in Power System protection

Paper Name: Numerical Methods
Paper Code: M(CS) 401
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to
CO1: Recall the distinctive characteristics of various numerical techniques and the associated error measures.
CO2: Understand the theoretical workings of various numerical techniques and to solve the engineering problems.
CO3: Apply the principles of various numerical techniques to solve various problems.
CO4: Analyze numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

Paper Name: Data Structure
Paper Code: CS(EE) 402
Course Outcome: On completion of the course students will be able to
CO1: Differentiate how the choices of data structure and algorithm methods impact the performance of program.

CO 2: Solve problems based upon different data structure and also write programs.
CO3: Identify appropriate data structure and algorithmic methods in solving problem.
CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

Paper Name: Physics – II Laboratory
Paper Code: PH(EE) 491
Course Outcome:
At the end of the course students' will be able to

CO1 : Demonstrate experiments allied to their theoretical concepts
CO2 : Conduct experiments using semiconductors , dielectric and ferroelectrics
CO3 : Classify various types of magnetic materials
CO4 : Participate as an individual, and as a member or leader in groups in laboratory sessions actively
CO5 : Analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments

Paper Name: Electrical Machines – I Laboratory
Paper Code: EE 491
Course Outcome:
After successful completion of this course, student will be able to
CO1: Understand the various connections of three phase transformer and induction motor.
CO2: Conduct different tests on Transformers, D.C. Machines, Three-Phase Induction Motor.
CO3: Analyze the characteristics of Transformers, D.C. Machines, Three-Phase Induction Motor.
CO4: Evaluate the different operations of single phase and three phase transformers.

Paper Name: Electrical and Electronics Measurement Laboratory
Paper Code: EE 492
Course Outcome:
CO1: Understand the operations of instrument transformers, bridges and different types analog and digital instruments

CO2: Apply knowledge to conduct experiment to measure of Resistance, Inductance, Capacitance, **Power and Energy.**

CO3: Interpreting the process of calibration and standardization of the instruments

CO4: Experiment of applications of instrument transformers in power system.

Paper Name: Numerical Methods Laboratory
Paper Code: M(CS) 491
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to

CO1: Apply the programming skills to solve the problems using multiple numerical approaches.
CO2: Analyze if the results are reasonable, and then interpret and clearly communicate the results.
CO3: Evaluate the accuracy of common numerical methods.
CO4: Implement numerical methods in Matlab.

Paper Name: Data Structure Laboratory
Paper Code: CS(EE) 492
Course Outcomes: After successful completion of this course, student will be able to
CO1. Choose appropriate data structure as applied to specified problem definition.
CO2. Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.
CO3. Have practical knowledge on the applications of data structures.
CO4. Store, manipulate and arrange data in an efficient manner.
CO5. Implement queue and stack using arrays and linked list. Implementation of queue, binary tree and binary search tree.

Paper Name: Technical skill Development
Paper Code: MC 481
Course Outcome: On completion of the course students will be able to

CO1: Prepare lists of material for a mini project.
CO2: Design an electric circuit as per the requirement of application.
CO3: Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
CO4: Write precise briefs or reports and technical documents.

Paper Name: ENVIRONMENTAL SCIENCE
Paper Code: HU 501

Course Outcome(s)
CO 1. To understand the natural environment and its relationships with human activities.
CO 2.To apply the fundamental knowledge of science and engineering to assess environmental and health risk.
CO 3. To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
CO 4. Acquire skills for scientific problem-solving related to air, water, noise& land pollution.

Paper Name: ELECTRICAL MACHINES – II
Paper Code: EE501

Course Outcome(s):
CO1. Describe the concept of rotating magnetic fields.
CO2. Demonstrate the operation of AC Machines.
CO3. Understand the principle of operation and know performance of synchronous machine and

fractional kW motors.
CO4. Analyse performance characteristics of ac machines.

Paper Name: Power System-I
Paper Code: EE502

Course Outcome(s):
CO.1: Illustrate the concepts of power system components and its associated terms.
CO.2: Classify different types of power generation.
CO.3: Interpreting mechanical and electrical design of overhead transmission lines.
CO.4: Analyze performances of power system.

Paper Name: CONTROL SYSTEMS-I
Paper Code: EE503
Course Outcome(s):
CO1: Get knowledge of basic structure of control systems, define basic terminologies, components.

CO2: Modelling physical systems using transfer function to analyze system dynamic and steady state behaviour.

CO3: Interpreting the concept of stability of the system using frequency domain analysis.

CO4: Design compensators in frequency domain and understand the concept of feedback system and controllers.

Paper Name: Microprocessor and Microcontroller
Paper Code: EE504
Course Outcome(s):

CO1. Able to correlate the architecture, instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085.
CO2. Able to interpreted the 8086 microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts.
CO3. Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o,interrupts.
CO4. Apply instructions for assembly language programs of 8085, 8086 and 8051
CO5. Design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and8051.

Paper Name: ELECTRICAL MACHINES – II LAB
Paper Code: EE591

Course Outcomes:
CO1. Perform different tests on Three-Phase A.C. Generators, Synchronous Motors and Single-Phase Induction Motor.
CO2. Interpret the observed result using theoretical knowledge and hence calculate unknown parameters.

CO3. Interpret the concept of the direct axis and quadrature axis reactance of a 3-phase synchronous machine.
CO4: Analyze the winding connection of single phase induction motor.

Paper Name: Power System-I LAB
Paper Code: EE592

Course Outcomes: After successful completion of this course, student will be able to
CO1. Estimate performance of Transmission Line and Distribution line.
CO2. Select line support for a particular Transmission Line.
CO3. Explain methods of active and reactive power control.
CO4. Test the reliability of different components of Transmission Line and Distribution Line.

Course Name: Control System – I Laboratory
Course Code: EE 593
Course Outcomes: After successful completion of this course, student will be able to
CO1. Simulate, analyze system behavior using software simulator/hardware.
CO2. Determine the stability of the system using frequency domain approach.
CO3. Design compensators, controllers to meet desired performance of system.
CO4: Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory by introducing the concepts of different stability theorems.

Course Name: Microprocessor and Microcontroller Laboratory
Course Code: EE 594
Course Outcomes:
CO1. Able to handle arithmetic and Logical operations, using assembly language programming in 8085 & 8086 Trainer Kits.
CO2. Able to program using arithmetic, logical and bit manipulation instructions of 8051.
CO3. Able to validate the interfacing technique of 8255 Trainer kit with 8085 & 8086 through Subroutine Call and IN/OUT instructions like glowing LEDs accordingly, to control stepper motor rotation, interfacing Seven Segment Display and to display a string etc.
CO4. Able to program and verify Timer/Counter and Interrupt handling in 8051.

Paper Name: Electrical System Design
Paper Code: EE581
Course Outcomes:
CO1: Understand the different electrical system.
CO2: Analyze the different software tools for design electrical system.
CO3. Able to design electrical systems.
CO4. Able to develop an idea of preparing bill of materials for a particular design.

Paper Name: CONTROL SYSTEMS-II
Paper Code: EE 603

Course Name: Control System – II
Course Code: EE 603
Course Outcome:
CO1: Interpreting state-variable equations for different systems.

CO2: Express and solve system equations in state-variable form (state variable models).

CO3: Examine the stability of nonlinear systems using appropriate methods.

CO4: Analyze and design of discrete time control systems using z transform.

Paper Name: Power System –II
Paper Code: EE602

Course Outcome: On successful completion of the course, the learner will be able to
CO1: Learn about advance structure of Power System.
CO2: Get depth knowledge of different types of power system protection, fault, stability analysis and load flow method.
CO3: Interpreting idea of real and reactive power control in single machine connected to infinite bus.
CO4: Design and analysis of different types of substation and implement these ideas in industry or real life problem solve.

Course Name: Power Electronics
Course Code: EE603

Course Outcome:

CO1: Acquire knowledge about fundamental concepts and techniques used in power electronics.
CO2: Analyze various single phase and three phase power converter circuits and understand their applications.
CO3: Identify basic requirements for power electronics based design application.
CO4: Develop skills to build, and troubleshoot power electronics circuits.
CO5: Understand the use of power converters in commercial and industrial applications.

Paper Name: Digital Signal Processing
Paper Code: EC (EE)604

Course Outcome:

CO1. Define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.
CO2. Interpret the properties of discrete time signals in time domain and frequency domain.
CO3. Describe finite word length effects and digital filters.
CO4. Analyze convolution for long sequences of data.
CO5. Implementation of digital filters.

Paper Name: Non-Conventional Energy sources and applications
Paper Code: EE605A

Course outcome:
On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Student will be able to understand the importance of Renewable energy over conventional process and learn different methods of Power generation from the Non-

conventional sources like Solar, Wind Energy, Biomass, Geothermal energy, OTEC, Tidal energy ,MHD Power generation schemes.
CO2: Students will be able to analyze the different techniques of grid integration of the power generated from renewable energy sources with the initiation of power electronic converters and drives.
CO3: Students will be able to design different hybrid energy systems and energy storage systems.

CO4: Acquire the knowledge on geothermal energy.

Paper Name: Introduction to Robotics
Paper Code: EE 605C

Course outcome:
On successful completion of this course, students should have the skills and knowledge to:

CO1: Demonstrate the basics knowledge and skills in practical robotics applications
CO2: Ability to apply mechanical structures of industrial robots and their operational workspace characteristics
CO3: Students will demonstrate knowledge of robot controllers.
CO4: Understand and demonstrate an ability to simulate, program, and control commercial Robots through hands-on experiments.
CO5: Understand industrial environment for robotics system.

Course Name: MECHATRONICS
Course Code: EE605D

Course Outcome:
After successful completion of the course students:
CO 1: Can realize the importance of mechatronic system to perform complex tasks, can elaborate the stepwise integration of sensors & actuators, control system, signal processing, power electronics.
CO 2: Demonstrate basic operations of PLC, different control theory and understand mechatronic applications.
CO3: Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
CO4: Development of PLC ladder programming and implementation of real life system.

Course Name: Introduction to JAVA
Course Code: CS (EE)606A

Course Outcomes: At the end of the course, the student will be able to
CO1: Design the process of interaction between Objects, classes & methods w.r.t. Object Oriented Programming.
CO2: Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java.
CO3: Analyze various activities of different string handling functions with various I/O operations.
CO4: Discuss basic code reusability feature w.r.t. Inheritance, Package and Interface.

CO5: Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

Course Name: Object Oriented Programming using C++
Course Code: CS (EE) 606B
Course Outcomes (Cos):
After the successful completion of the course, student will be able to
CO1: Creating simple programs using classes and objects in C++.
CO2: Implement Object Oriented Programming Concepts in C++.
CO3: Develop applications using stream I/O and file I/O.
CO4: Implement simple graphical user interfaces.
CO5: Implement Object Oriented Programs using templates and exceptional handling concepts.

Paper Name: Software Engineering
Paper Code: CS (EE) 606D

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

CO.1. To identifies, formulates, and solves software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
CO.2. Toanalyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project.
CO.3.To design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns.
CO.4. To acquire the ability to function effectively in teams.
CO.5. To develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.
CO.6. To identify modern engineering tools necessary for software project management, time management and software reuse, and an ability to engage in life-long learning.

Course Name: Control System – II Laboratory
Course Code: EE 691
Course Outcomes: On completion of the course students will be able to
CO1. Conduct experiments on Position Control with proper tuning of P, PI and PID controller.
CO2. Demonstrate Lead-Lag Compensators.
CO3. Investigate the response of a Real Time System using State Variable Analysis.
CO4. Analyse Performance of Discrete-Time System an Non-Linear System.

Course Name: Power System – II Laboratory
Course Code: EE 692
Course Outcomes: On completion of the course students will be able to
CO1. Analyse the testing, operation and response of protection of electrical instruments.
CO2. Conduct experimental investigation and gain knowledge of various parts of relays and its operation.
CO3. Able to incorporate the measuring error with actual value and calibrate the instrument transformers.

CO4. Enhance the capability of software analysis by load flow solution in ETAP, MATLAB etc.

Course Name: Power Electronics Laboratory
Course Code: EE693
Course Outcome
On successful completion of the learning sessions of the course, the learner will be able to:
CO1: The skill to analyze the response of any power electronics devices.
CO2. The ability to troubleshoot the operation of an power electronics circuit.
CO3. The ability to select suitable power electronic devices for a given application.
CO4. The ability to know how to control and convert output signal as per requirements.
CO5. The ability to construct any power electronics circuits as needed in operation.

Course Name: Electrical System Design-II
Course Code: EE681
Course Outcome
On completion of the course students will be able to
CO1: Gain knowledge of designing a system.
CO2: Synchronize different machines in a system.
CO3: Use of theoretical designing concept to implement a practical model.
CO4: Estimate and planning system.

Course Name: Introduction to JAVA Lab
Course Code: CS(EE)696A

Course Outcomes: On completion of the course students will be able to
CO1: Create the procedure of communication between Objects, classes & methods.
CO2: Understand the elementary facts of Object Orientation with various characteristics as well as several aspects of Java.
CO3: Analyze distinct features of different string handling functions with various I/O operations.
CO4: Discuss simple Code Reusability notion w.r.t. Inheritance, Package and Interface.
CO5: Apply Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

Paper Name: Software Engineering Lab
Paper Code: CS(EE)696D

Course Outcomes:
CO1 To handle software development models through rational method.
CO2 To prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO3 To Develop function oriented and object oriented software design using tools like rationalrose.
CO4 To perform unit testing and integration testing.
CO5 To apply various white box and black box testing techniques.

Paper Name: ELECTRIC DRIVES
Paper Code: EE701

Course Outcomes:

CO1: Understand the characteristics of electric motors required for a particular drive.

CO2: Interpret the concept of selection of motor power rating.

CO3: Illustrate different types of braking and speed-control of electric motors for various applications.

CO4: Justify power electronic converters for various kinds of drive operations.

Paper Name : Utilization of Electric Power
Paper Code:- EE 702A

Course Outcomes (COs):

After successful completion of the course students will be able to

CO1. Demonstrate the working of traction motor and their control under different working conditions.

CO2. Analyze illumination level for a given application and select the suitable specification for installation.

CO3. Illustrate the working of Electric Heating, welding processes.

CO4. Explain the process of electrolysis.

Paper Name: Advanced Power Electronics
Paper Code: EE702B

Course Outcomes (COs):

CO1: Describe the basic concepts of resonant converters, matrix converter and multilevel inverter.

CO2: Describe the basic concepts of matrix converter and multilevel inverter.

CO3: Understand the operations of permanent magnet and switched reluctance motor drive.

CO4: Apply the knowledge of contemporary technical issues in Power electronics field and Compensators currently used in modern industries.

Course Name: Illumination Engineering
Course Code: EE 702C

Course Outcome (COs):

CO1: Develop a clear idea on various illumination techniques and hence can design lighting schemes for specific applications.

CO2. Analyse the fundamentals of illumination and its measurements with different apparatus.

CO3. Explain the characteristics of various types of lamp with their accessories and their control circuits.

CO4. Demonstrate the interior and exterior lighting.

Paper Name: Advance Power System
Paper Code: EE703A

Course Outcomes (COs):
CO 1: Acquire in-depth advance knowledge in the domain of modern and industrial oriental power systems.
CO 2: Ability to critically analyse various power systems components, models and their operation, optimization of cost criteria.
CO 3: Ability to apply fundamentals and concepts to analyse, formulate and solve complex Problems of electrical power systems and its components and control of frequency and voltages.
CO 4: Ability to use advanced techniques, skills and modern scientific and engineering tools for professional practice for power system to enhanced power quality, stability, reliability, security and load ability.

Paper Name: Power Generation and Economics
Paper Code: EE 703B

Course Outcomes(COs):
At the end of the course, a student will be able to:
CO 1. Describe and analyse different types of sources and mathematical expressions related to with power generation and economics.
CO 2. Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.
CO 3. Discuss the working principle and basic components of the steam power plants, hydro electric plants, nuclear power plant and the economic principles and safety precautions involved with it.
CO 4. Discuss and analyse the mathematical and working principles of different electrical equipments involved in the generation of power.

Course Name: High Voltage Engineering
Course Code: EE 605B

Course Outcome (COs):
On completion of the course students will be able to
CO1. Understand the basic physics associated with various breakdown processes in different insulating materials.
CO2. Knowledge of generation and measurement of A. C., D.C.,Impulse voltages and currents.
CO3. Knowledge of tests on H.V. equipment and on insulating materials, as per the standards.
CO4. Knowledge of the causes of Overvoltages in power system and Insulation Coordination in a substation.

Course Name: Digital Image Processing
Course Code:CS(EE)705B

Course Outcomes: At the end of the course, the student will be able to
CO1: Explain the structure of human eye, image formation, Brightness, sensing and acquisition, storage, Processing, Communication, Display Image Sampling and quantization, spectrum analysis.
CO2: Illustrate image Enhancement in the Spatial and Frequency Domain, image transformations, Histogram processing, time and Spatial filtering.

CO3: Evaluate Image and video Data Compression, Redundancies.
CO4: Develop Morphological Processed Image using Dilation, Erosion, Opening, closing, Hit -or-miss transformation.
CO5: Evaluate Image Segmentation by detection of discontinuities, Edge linking and Boundary detection, Thresholding, Image Representation schemes, Boundary descriptors, and Regional descriptors.

Paper name: COMPUTER NETWORKING
Paper Code: CS(EE)705C

Course Outcomes(COs)
CO1: Understand OSI and TCP/IP models.
CO2: Analyze MAC layer protocols and LAN technologies.
CO3: Design applications using internet protocols.
CO4: Implement routing and congestion control algorithms.
CO5: Develop application layer protocols and understand socket programming.

Paper name: DATABASE MANAGEMENT SYSTEM
Paper Code: CS(EE)705D

Course Outcomes(COs)
On completion of the course students will be able to
CO 1. Apply the knowledge of Entity Relationship (E-R) diagram for an application.
CO 2. Create a normalized relational database model
CO 3. Analyze real world queries to generate reports from it.
CO 4. Determine whether the transaction satisfies the ACID properties.
CO 5. Create and maintain the database of an organization.

Paper Name: VALUE AND ETHICS IN PROFESSION
Paper Code: HU 702

Course Outcomes(COs)
CO1. Understand the core values that shape the ethical behavior of an engineer and exposed awareness on professional ethics and human values.
CO2. understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
CO3. understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
CO4. Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
CO5. 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.

Paper Name: ELECTRIC DRIVES LAB
Paper Code: EE791

Course Outcomes (COs):
CO1: Apply power electronic converters for motor speed control.
CO2: Analyze the characteristics of electric motors for different type of loads.

CO3: Interpret the concept by experiment of braking of D.C. and A.C. motor.
CO4: Combine the use of computer-based simulation tools relevant to electrical Drives with practical laboratory experimentation.

Paper Name: COMPUTER NETWORKING LAB
Paper Code: EE795C

Course Outcomes (COs):
CO1: Demonstrate the socket program using TCP & UDP.
CO2: Develop simple applications using TCP & UDP.
CO3: Develop the code for Data link layer protocol simulation.
CO4: Examine the performances of Routing protocol.
CO5: Experiment with congestion control algorithm using network simulator.

Paper Name: DATABASE MANAGEMENT SYSTEM LAB
Paper Code: CS (EE)795D

Course Outcomes (COs):
On completion of the course students will be able to
CO1. Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.
CO2. Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.
CO3. Differentiate between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.
CO4. Analyse database system concepts and apply normalization to the database.
CO5. Apply and create different transaction processing and concurrency control applications.

Course Name: HVDC Transmission Systems
Course Code: EE 801A
Course Outcomes: At the end of the course, the student will be able to
CO1: Describe HVDC converters and HVDC transmission.
CO2: Formulate and solve mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC links.
CO3: Analyze the different harmonics generated by the converters and their variation with the change in firing angles.
CO4: Distinguish the nature of faults on the converters and their protection schemes.
CO5: Demonstrate the existing HVDC systems along with MTDC systems and modern transmission system.

Paper Name: Energy management & audit
Paper Code: EE801B
Course Outcome (COs) :
On completion of the course students will be able to

CO1: Identify the demand supply gap of energy in Indian scenario
CO2: Carry out energy audit of an industry/Organization.
CO3: Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
CO4: Select appropriate energy conservation method to reduce the wastage of energy.
CO5: Evaluate the techno economic feasibility of the energy conservation technique adopted.

Course Name: Power Plant Engineering
Course Code: EE 801C
Course Outcome:
CO1. Understand the principles of operation for different power plants.
CO2. Understand the economics of operation for different power plants.
CO3. Interpreting the concept of load curve, cold reserve, hot reserve, spinning reserve for the operation of different power plants.
CO4. Analyse the interconnection between different power plants.

Paper Name: Sensors and Transducers
Paper Code: EE802A

Course Outcome:
CO1: Students should be able to illustrate the fundamental principles of various types of sensors.
CO2: Students should be able to compare the different types of transducers available.
CO3: Students should be familiar with criteria to recommend appropriate sensors to perform engineering tasks and scientific researches.
CO4: Students will be able to understand the design of different Sensors.

Paper Name: PROCESS CONTROL AND INSTRUMENTATION
Paper Code: EE802B
Course Outcome:
Upon successful completion of the course students will be able to:
CO1: Design controller by applying the knowledge of different control action
CO2: Calculate controller parameters by applying different tuning methods
CO3: Describe different advanced control strategy
CO4: State the operation and use of final control element
CO5: Develop ladder diagram

Course Name: Industrial and Financial Management
Course Code: HU 805
Course Outcomes: At the end of the course, the student will be able to
CO1: Explain and describe various technology-based business models and the dynamics of value creation, value proposition, and value capture in industrial enterprises.
CO2: Select, interpret and use different costing techniques as a basis for decisions in various business situations.
CO3: Understand the basic principles of financial accounting and reporting.
CO4: Explain how the industrial company markets and price its products considering GST.

Department of Electrical Engineering

COURSE OUTCOMES OF R (18)

Course Name: Mathematics – I
Course Code: M 101
Course Outcome (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the distinctive characteristics of matrix algebra and calculus.

CO2: Understand the theoretical working of matrix algebra and calculus.

CO3: Apply the principles of matrix algebra and calculus to address problems in their disciplines.

CO4: Examine the nature of system using the concept of matrix algebra and calculus.

Course Name: Chemistry
Course Code: CH 101
Course Outcome (COS):
After the completion of the course the students will be able to:

CO1: Able to remember fundamental concepts of Chemistry and define relevant terminologies.

CO2: Able to understand the principles of thermodynamics, spectroscopy and related physical properties of molecules.

CO3: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries and technical fields.

CO4: Able to analyze and explain protective measures of corrosion of metals in the industries.

CO5: Able to assess theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

Course Name: Basic Electrical Engineering
Course Code: EE101
Course Outcomes (COs):

After completion of the course students able to:

CO1. UnderstandBasicElectricalcircuits,PowerdistributionandSafetymeasures.

CO2. Analyze an apply DC network theorems.

CO3. Analyze and apply concept of AC circuits of single-phase and three-phase.

CO4. Understand basic principles of Transformers and Rotating Machines.

Course Name: English
Course Code: HU 101
Course Outcome (COs): After completion of the course students able to

CO1: Know about and employ communication in a globalized workplace scenario.

CO2: Understand and apply functional grammar, reading skills and sub-skills.

CO3: Acquire a working knowledge of writing strategies, formats and templates of professional writing.

CO4: Apply and make use of the modalities of intercultural communication.

Course Name: Chemistry Lab
Course Code: CH 191
Course Outcome
After completion of the course students able to:

CO1: operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
CO2: work as an individual also as a team member
CO3: analyze different parameters of water considering environmental issues
CO4: synthesize nano and polymer materials.
CO5: design innovative experiments applying the fundamentals of chemistry

Course Name: Basic Electrical Engineering Lab
Course Code: EE191
Course Outcome:
After completion of the course students able to:
CO1. Identify and use common electrical components.
CO2. Develop electrical networks by physical connection of various components and analyze the circuit behavior.
CO3. Apply and analyze the operational characteristics of electrical machines.
CO4. Apply and analyze the equivalent parameters, Losses, efficiency of transformers.

Course Name: Engineering Graphics & Design
Course Code: ME 191
Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:
CO1: Learn basics of drafting and use of drafting tools which develops the fundamental

skills of industrial drawings.

CO2: Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

CO3: Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

CO4: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

Course Name: Mathematics – II

Course Code: M 201

Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the properties of Laplace Transform to evaluate multiple integrals and their usage

CO2: Understand the concept of Laplace transform to solve ordinary differential equations

CO 3: Apply effective mathematical tools for the solutions of ordinary differential equations that model physical processes.

CO4: Analyze to mathematical tools to evaluate multiple integrals and vector integral

Course Name: Physics –I

Course Code: PH 201

Course Outcome(COs): At the end of the course students should be able to

CO1: Describe various types mechanical resonance and its electrical equivalence

CO2: Explain basic principles of Laser, Optical fibers and various types of semiconductors

CO3: Apply superposition to explain interference and diffraction as well as apply wave mechanics for attainment of Heisenberg's uncertainty principle

CO4: Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors

CO5: Justify the need of quantum mechanics as remedy to overcome limitations imposed by classical physics.

Course Name: Basic Electronics Engineering

Course Code: EC 201

Course Outcome (COs): After successful completion of the course, students will be able to:

CO1: Understand the PN junction diode, ideal diode, diode models and its circuit analysis, Remember the application of diodes and special diodes.

CO2: Analyse how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration differentiation on electronic signals.

CO3: Assess both positive and negative feedback in electronic circuits.

CO4: Develop the capability to analyse and design simple circuits containing non-liner elements such as transistors using the concepts of load lines, operating points and incremental analysis.

Course Name: Programming for Problem Solving

Course Code: CS 201

Course Outcome (COs): On completion of the course students will be able t**o**

- **CO1.** Understand and differentiate among different programming languages for problem solving.
- **CO2.** Describe the way of execution and debug programs in C language.
- **CO3.** Define, select, and compare data types, loops, functions to solve mathematical and scientific problem.
- **CO4.** Understand the dynamic behavior of memory by the use of pointers.
- **CO5.** Design and develop modular programs using control structure, selection structure and file.

Course Name: Engineering Mechanics

Course Code: ME 201

Course Outcome (COs): On completion of the course students will be able to

CO1: Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

CO2: Study the effect of friction in static and dynamic conditions.

CO3: Understand the different surface properties, property of masses and material properties.

CO4: Analyze and solve different problems of kinematics and kinetics.

Course Name: Programming for Problem Solving Laboratory

Course Code: CS 291

Course Outcomes (COs): On completion of the course students will be able to

CO1: Learn the concept of DOS system commands and editor.

CO2: Formulate the algorithms for simple problems and to translate given algorithms to a working and correct program.

CO3: To identify and correct syntax errors / logical errors as reported during compilation time and run time.

CO4: To be able to write iterative as well as recursive programs.

CO5: Learn the concept of programs with Arrays, Pointers, Structures, Union and Files.

Course Name: Physics – ILaboratory

Course Code: PH 291

Course Outcomes (COs): Student will able to:

CO1: Demonstrate experiments allied to their theoretical concepts

CO2: Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer

CO3: Participate as an individual, and as a member or leader in groups in laboratory sessions actively

CO4: Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.

Course Name: Basic Electronics Engineering Laboratory

Course Code: EC 291

Course Outcomes (COs):

CO1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
CO2: Analyse the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
CO3: Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
CO4: Able to know the application of Diode, BJT & OPAMP.

Course Name: Workshop/Manufacturing Practices
Course Code: ME 292

Course Outcomes (COs): Upon completion of this laboratory course, students will be able to

CO1: Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

CO2: Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cuttingetc used in manufacturing processes.

CO 3: Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.

CO4: Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

Course Name: Language Laboratory
Course Code: HU 291
Course Outcome (COs):

- **CO1.** Listen to and summarize, interpret and explain audio material/data in English
- **CO2.** Understand and implement the basics of note taking of factual data/information in English and keep a laboratory record
- **CO3.** Engage in spoken interaction using needs specific vocabulary, language function and pronunciation in conversations, role plays and group discussions
- **CO4.** Maintain and keep a listening log and write a film review.

Course Name: Electrical Circuit Analysis
Course Code: EE 301
Course Outcomes: On successful completion of the learning sessions of the course, the learner will be able to

- **CO1.** Understand the basic concepts of electric, magnetic and filter circuits.
- **CO2.** Synthesize different electrical circuits with network theorems.
- **CO3.** Analyze the transient condition of electrical circuits.
- **CO4.** Analyze two port circuit behaviors.

Course Name: Measurement and Instrumentation
Course Code: EE 302
Course Outcomes:
CO1: Understand the operating principles of electrical and electronic measuring instruments.
CO2: Understand the functions of different Sensors and Transducers
CO3: Identify and measure various physical parameters using appropriate measuring instruments.

CO4: Application of Current Transformer and Potential transformer in Power System protection

Course Name: Analog Electronics

Course Code: EE 303

Course Outcomes: After completion of the course, students will be able to

- **CO1.** Understand linear and nonlinear applications of OPAMP
- **CO2.** Understand effects of different feedback mechanism in amplifier circuit.
- **CO3.** Analyze transistor amplifier circuit.
- **CO4.** Student will be able to design power amplifier circuit.

Course Name: Mathematics – III
Course Code: M(EE) 301
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to:

CO1 : Recall the distinctive characteristics of matrix algebra and calculus.
CO2: Understand the theoretical working of matrix algebra and calculus.
CO3: Apply the principles of matrix algebra and calculus to address problems in their disciplines.
CO4: Examine the nature of system using the concept of matrix algebra and calculus.

Course Name: Electrical Circuit Analysis Laboratory
Course Code:EE391
Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to:
CO1. Demonstrate transient analysis of electric circuits
CO2. Analysis of frequency response characteristics of Filter circuits.
CO3. Analyze signals using mathematical tools/ software
CO4. Determination of parameter of different kinds of Electrical Networks.

Course Name: Measurement and Instrumentation Laboratory
Course Code: EE 392

Course Outcome: On successful completion of the learning sessions of the course, the learner will be able to:

- **CO1.** Understand the operations of instrument transformers, bridges and different types analog and digital instruments
- **CO2.** Apply knowledge to conduct experiment to measure of Resistance, Inductance, Capacitance, Powerand Energy.
- **CO3.** Interpreting the process of calibration and standardization of the instruments
- **CO4.** Experiment of applications of instrument transformers in power system.

Course Name: Analog Electronics Laboratory
Course Code: EE 393
Course Outcome:
CO1. Able to understand, analyse the analog circuits pertaining to applications like amplifier, oscillators andtimer.
CO2. Able to know how to interface digital circuits with ADC &DAC.
CO3. Able to understand the fundamental concepts and techniques used in digital electronics.
CO4. Able to understand and examine the structure of various number systems, De- Morgan's law, Boolean algebra and its application in digitaldesign.
CO5. Able to understand, analyse the analog circuits pertaining to applications like amplifier, oscillators andtimer.
CO6. Able to know how to interface digital circuits with ADC &DAC.

Course Name: Environmental Science
Course Code:MC 301
Course Outcome:
After completion of this course, student will be able

CO1: To understand the natural environment and its relationships with human activities.

CO2: To apply the fundamental knowledge of science and engineering to assess environmental and health risk.

CO3: To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.

CO4: Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

Course Name:Physics – II
Course Code:PH 401
Course Outcomes: After completion of this course student will be able to
CO1. Explain electron transport in metal-insulators and semiconductors using energy Band theory.
CO2. Apply Schrödinger equation in variety of atomic scale problems including nanomaterials.
CO3. Analyze the physics of various kinds of electric and magnetic materials
CO4. Justify the importance of Fermi energy level in turning electronic properties of various.

Course Name: Electrical Machines - I
Course Code: EE 401
Course Outcome:

On completion of this course, students will be capable of

CO1. Describe the concept of magnetic circuits.

CO2. Demonstrate the operation of different types of dc machines and its applications.

CO3. Understand the equivalent circuit of Transformers, D.C. Machines, and Three-Phase Induction Motor.

CO4. Analyse the connections of transformers and its applications.

Course Name: Power Electronics

Course Code: EE402

Course Outcome: On successful completion of the learning sessions of the course, student will be able to:

CO1: Acquire knowledge about fundamental concepts and techniques used in power electronics.
CO2: Understand the use of power converters in commercial and industrial applications.
CO3: Analyze various single phase and three phase power converter circuits and understand their applications.
CO4: Identify basic requirements for power electronics based design application.
CO5: Develop skills to build, and troubleshoot power electronics circuits.

Course Name: Digital Electronics
Course Code: EE403
Course Outcome: The students will be able to:
CO1: Acquired knowledge about solving problems related to number systems conversions and Boolean algebra and design logic circuits using logic gates to their simplest forms using De Morgan's Theorems; Karnaugh Maps.
CO2: Design of combinational circuits
CO3: Design of various synchronous and asynchronous sequential circuits using State Diagrams & Tables.
CO4: Understand DAC & ADC technique and corresponding circuits
CO5: Analyze logic family interfaces, switching circuits & memory storage devices to Plan and execute projects.

Course Name: Electromagnetic Fields

Course Code: EE404

Course Outcome:

CO1. Know the orthogonal co-ordinates and their transformation to solve &analyze problems on vector calculus.
CO2. Know the basic laws of electrostatics and electromagnetism and define associated terms.
CO3. Understand Maxwell's equation in different forms.
CO4. Understand the propagation of EM waves associated with different Electrical Networks.

Course Name: Values and Ethics in Profession
Course Code: HU401
Course Outcome: On Completion of this course student will be able to
CO1. Understand the core values that shape the ethical behavior of an engineer and Expose daw areness on professional ethics and human values.
CO2. Understand the basic perception of profession, professional ethics, various moral issues
CO3. Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
CO4. Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
CO5. 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.

Course Name: Physics – II Laboratory
Course Code: PH 491

Course Outcome: At the end of the course students' will be able to
CO1. Demonstrate experiments allied to their theoretical concepts
CO2. Conduct experiments using semiconductors , dielectric and ferroelectrics
CO3. Classify various types of magnetic materials.
CO4. Participate as an individual, and as a member or leader in groups in laboratory sessions actively.
CO5. Analyze experimental data from graphical representations, and to communicate effectively them in laboratory reports including innovative experiments.

Course Name: Electrical Machines – I Laboratory
Course Code: EE 491

Course Outcomes: After successful completion of this course, student will be able to
CO1: Understand the various connections of three phase transformer and induction motor.
CO2: Conduct different tests on Transformers, D.C. Machines, Three-Phase Induction Motor.
CO3: Analyze the characteristics of Transformers, D.C. Machines, Three-Phase Induction Motor.
CO4: Evaluate the different operations of single phase and three phase transformers.

Course Name: Power Electronics Laboratory

Course Code: EE 492

Course Outcomes: After successful completion of this course, student will be able to

- **CO1.** The skill to analyze the response of any power electronics devices.
- **CO2.** The ability to troubleshoot the operation of a power electronics circuit.
- **CO3.** The ability to select suitable power electronic devices for a given application.
- **CO4.** The ability to know how to control and convert output signal as per requirements.
- **CO5.** The ability to construct any power electronics circuits as needed in operation.

Course Name: Digital Electronics Laboratory

Course Code: EE 493

Course Outcomes:

- **CO1.** Able to understand the fundamental concepts and techniques used in digital electronics.
- **CO2.** Able to understand and examine the structure of various number systems, De-Morgan's law, Boolean algebra and its application in digital design.
- **CO3.** Able to understand, analyse the timing properties (input setup and hold times, minimum clock period, output propagation delays) and design various combinational and sequential circuits using various metrics: switching speed, throughput/latency, gate count and area, energy dissipation and power.
- **CO4.** Able to understand different digital circuits using Programmable Logic Devices.
- **CO5.** Able to know how to interface digital circuits with ADC & DAC.

Course Name: Behavioral & Interpersonal Skills
Course Code: MC 481
Course Outcome:

- **CO1.** It will equip the student to handle workplace interpersonal communication in an effective manner.
- **CO2.** To enable students with strong oral and written interpersonal communication skills.
- **CO3.** To prepare students to critically analyze workplace situations and take appropriate decisions.
- **CO4.** To make students campus ready through proper behavioral and interpersonal grooming.
- **CO5.** Integration of enhanced skill set to design and frame team based Project Report and Presentation.

Course Name: Electrical Machines - II
Course Code: EE 501
Course Outcome:

On completion of this course, students will able to

CO1. Describe the concept of rotating magnetic fields.
CO2. Demonstrate the operation of AC Machines.
CO3. Understand the principle of operation and know performance of synchronous machine and fractional kW motors.
CO4. Analyse performance characteristics of ac machines.

Course Name: Power System - I
Course Code: EE 502
Course Outcome:

On completion of this course, students will be able to

EE502.1: Illustrate the concepts of power system components and its associated terms.
EE502.2: Classify different types of power generation.
EE502.3: Interpreting mechanical and electrical design of overhead transmission lines.
EE502.4: Analyze performances of power system.

Course Name: Control System - I
Course Code: EE 503
On completion of this course, students will be capable of

CO1: Get knowledge of basic structure of control systems, define basic terminologies, components.

CO2: Modelling physical systems using transfer function to analyze system dynamic and steady state behaviour.

CO3: Interpreting the concept of stability of the system using frequency domain analysis.

CO4: Design compensators in frequency domain and understand the concept of feedback system and controllers.

Course Name: Data Structure
Course Code: EE 504A
Course Outcome: On completion of the course students will be able to
CO1. Differentiate how the choices of data structure and algorithm methods impact the performance of program.
CO2. Solve problems based upon different data structure and also write programs.
CO3. Identify appropriate data structure and algorithmic methods in solving problem.

CO4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
CO5. Compare and contrast the benefits of dynamic and static data structures implementations.

Course Name: Computer Network
Course Code: EE 504B
Course Outcome: On completion of the course students will be able to
CO1. Understand OSI and TCP/IP models.
CO2. Analyze MAC layer protocols and LAN technologies.
CO3. Design applications using internet protocols.
CO4. Implement routing and congestion control algorithms.
CO5. Develop application layer protocols and understand socket programming.

Course Name: Internet of Things
Course Code: EE 504C
Course Outcome: On completion of the course students will be able
CO1. Understand the concepts of Internet of Things.
CO2. Analyze basic protocols in wireless sensor network.
CO3. Design IoT applications in different domain and be able to analyze their performance.
CO4. Implement basic IoT applications on embedded platform.

Course Name: Electrical Energy Conservation and Auditing
Course Code: EE 505A
Course Outcome:
CO1. Identify the demand supply gap of energy in Indian scenario.
CO2. Carry out energy audit of an industry/Organization.
CO3. Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
CO4. Select appropriate energy conservation method to reduce the wastage of energy.
CO5. Evaluate the techno economic feasibility of the energy conservation technique adopted.

Course Name: Electromagnetic Waves
Course Code: EE 505B
Course Outcome:
CO1. Understand the propagation of EM waves associated with different Electrical Networks.
CO2. Apply Maxwell_s equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
CO3. Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.
CO4. Apply concepts of Antenna Engineering and its applications.

Course Name: Illumination Engineering
Course Code: EE 505C
Course Outcome:
CO1. Analyse the fundamentals of illumination and its measurements with different apparatus.
CO2. Explain the characteristics of various types of lamp with their accessories and their control circuits.

CO3. Interpreting the concept of illumination control and control circuits for the energy conservation.
CO4. Demonstrate the interior and exterior lighting.

Course Name: Power Plant Engineering
Course Code: EE 505D
Course Outcome:
CO1. Understand the principles of operation for different power plants.
CO2. Understand the economics of operation for different power plants.
CO3. Interpreting the concept of load curve, cold reserve, hot reserve,spinning reserve for the operation of different power plants.
CO4. Analyse the interconnection between different power plants.

Course Name: Electrical Machines – II Laboratory
Course Code: EE 591
Course Outcomes: After successful completion of this course, student will be able to
CO1. Describe the concept of rotating magnetic fields.
CO2. Demonstrate the operation of AC Machines.
CO3. Understand the principle of operation and know performance of synchronous machine and
fractional kW motors.
CO4. Analyse performance characteristics of ac machines.

Course Name: Power System – I Laboratory
Course Code: EE 592
Course Outcomes: After successful completion of this course, student will be able to
CO1. Estimate performance of Transmission Line and Distribution line.
CO2. Select line support for a particular Transmission Line.
CO3. Explain methods of active and reactive power control.
CO4. Test the reliability of different components of Transmission Line and Distribution Line.

Course Name: Control System – I Laboratory
Course Code: EE 593
Course Outcomes: After successful completion of this course, student will be able to
CO1. Simulate, analyze system behavior using software simulator/hardware.
CO2. Determine the stability of the system using frequency domain approach.
CO2. Design compensators, controllers to meet desired performance of system.

Course Name: Data Structure Laboratory
Course Code: EE 594A
Course Outcomes: After successful completion of this course, student will be able to
CO1. Choose appropriate data structure as applied to specified problem definition.
CO2. Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.
CO3. Have practical knowledge on the applications of data structures.

CO4. Store, manipulate and arrange data in an efficient manner.
CO5. Implement queue and stack using arrays and linked list. Implementation of queue, binary tree and binary search tree.

Course Name: Computer Network Laboratory
Course Code: EE 594B
Course Outcomes: After successful completion of this course, student will be able to
CO1. Demonstrate the socket program using TCP and UDP.
CO2. Develop simple applications using TCP and UDP.
CO3. Develop the code for Data link layer protocol simulation.
CO4. Examine the performances of Routing protocol.
CO5. Experiment with congestion control algorithm using network simulator.

Course Name: Internet of Things Laboratory
Course Code: EE 594C
Course Outcomes: After successful completion of this course, student will be able
CO1. Understand the concepts of Internet of Things.
CO2. Explain the IoT tools like Arduino Uno, Raspberry Pi.
CO3. Design IoT applications in different domain and be able to analyze their performance.
CO4. Implement basic IoT applications on embedded platform.

Course Name: Constitution of India
Course Code: MC 501
Course Outcome:
CO1. Develop human values, create awareness about law ratification and significance of Constitution.
CO2. Comprehend the Fundamental Rights and Fundamental Duties of the Indian Citizen to implant morality, social values and their social responsibilities.
CO3. Create understanding of their Surroundings, Society, Social problems and their suitable solutions.
CO4. Familiarize with distribution of powers and functions of Local Self Government.
CO5. Realize the National Emergency, Financial Emergency and their impact on Economy of the country.

Course Name: Microprocessor and Microcontroller
Course Code: EE 601
Course Outcome:
On completion of this course, students will be capable of

CO1: Apply the knowledge of the internal architecture 8085/8086 microprocessors and 8051 for a specific application.

CO2: Analyzing various instructions related to particular programs for specific applications.
CO3: Analyzing the concept of interfacing circuits to some real time applications
CO4: Designing various microprocessor and microcontroller based systems for a specific application.

Course Name: Power System – II
Course Code: EE 602
Course Outcome: On successful completion of the course, the learner will be able to
CO1: Learn about advance structure of Power System.
CO2: Get depth knowledge of different types of power system protection, fault, stability analysis and load flow method.
CO3: Interpreting idea of real and reactive power control in single machine connected to infinite bus.
CO4: Design and analysis of different types of substation and implement these ideas in industry or real life problem solve.

Course Name: Control System – II
Course Code: EE 603
Course Outcome:
CO1: Interpreting state-variable equations for different systems.

CO2: Express and solve system equations in state-variable form (state variable models).

CO3: Examine the stability of nonlinear systems using appropriate methods.

CO4: Analyze and design of discrete time control systems using z transform.

Course Name: Data Base Management System
Course Code: EE 604A
Course Outcome: On completion of the course students will be able to
CO1. Apply the knowledge of Entity Relationship (E-R) diagram for an application.
CO2. Create a normalized relational database model.
CO3. Analyze real world queries to generate reports from it.
CO4. Determine whether the transaction satisfies the ACID properties.
CO5. Create and maintain the database of an organization.

Course Name: Embedded Systems
Course Code: EE 604B
Course Outcome:
CO1. To familiarize with concepts related to the fundamental principles embedded systems design, explain the process and apply it.
CO2. To understand knowledge of the advanced Embedded technology both for hardware and software.
CO3. To understand Hardware/Software design techniques for microcontroller-based embedded systems and apply techniques in design problems.
CO4. To develop Embedded System programming in C and assembly language using Integrated Development Environments and using debugging technique.

Course Name: Software Engineering
Course Code: EE 604C
Course Outcome: On completion of the course students will be able to
CO1. Understand the structure and behavior a software system the UML class diagrams and state diagrams.

CO2. Understand common lifecycle processes including waterfall (linear), incremental approaches (such as Unified process), and agile approaches.
CO3. Apply software testing and quality assurance techniques at the module level, and understand these techniques at the system and organization level.
CO4. Work collaboratively in a small team environment to develop a moderate-sized software system from conceptualization to completion, including requirements elicitation, system modelling, system design, implementation, unit and system testing, integration, source code management configuration management, and release management.
CO5. Prepare technical documentations and make presentations on various aspects of a software development project, including the technical aspects (architecture, design, quality assurance) as well as the managerial aspects (planning, scheduling, and delivery).

Course Name: Digital Signal Processing
Course Code: EE 605A
Course Outcome:
On completion of this course, students will able to

CO1: Define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.

CO2: Interpret the properties of discrete time signals in time domain and frequency domain.

CO3: Describe finite word length effects and digital filters.

CO4: Analyze convolution for long sequences of data.

CO5: Implement digital filters.

Course Name: High Voltage Engineering
Course Code: EE 605B
Course Outcome: On completion of the course students will be able to
CO1. Understand the basic physics associated with various breakdown processes in different insulating materials.
CO2. Knowledge of generation and measurement of A. C., D.C.,Impulse voltages and currents.
CO3. Knowledge of tests on H.V. equipment and on insulating materials, as per the standards.
CO4. Knowledge of the causes of Overvoltage's in power system and Insulation Coordination in a substation.

Course Name: Computer Architecture
Course Code: EE 605C
Course Outcome: On completion of the course students will be able to
CO1. Learn pipelining concepts with a prior knowledge of stored program methods.
CO2. Learn about memory hierarchy and mapping techniques.
CO3. Study of parallel architecture and interconnection network.
CO4. Interpret the concept of Multiprocessor Architecture.

Course Name: Microprocessor and Microcontroller Laboratory
Course Code: EE 691

Course Outcomes:
CO1. Able to handle arithmetic and Logical operations, using assembly language programming in 8085 & 8086 Trainer Kits.
CO2. Able to Program using arithmetic, logical and bit manipulation instructions of 8051.
CO3. Able to validate the interfacing technique of 8255 Trainer kit with 8085 & 8086 through Subroutine Call and IN/OUT instructions like glowing LEDs accordingly, to control stepper motor rotation, interfacing Seven Segment Display and to display a string etc.
CO4. Able to program and verify Timer/Counter and Interrupt handling in 8051.

Course Name: Power System – II Laboratory
Course Code: EE 692
Course Outcomes: On completion of the course students will be able to
CO1. Analyse the testing, operation and response of protection of electrical instruments.
CO2. Conduct experimental investigation and gain knowledge of various parts of relays and its operation.
CO3. Able to incorporate the measuring error with actual value and calibrate the instrument transformers.
CO4. Enhance the capability of software analysis by load flow solution in ETAP, MATLAB etc.

Course Name: Control System – II Laboratory
Course Code: EE 693
Course Outcomes: On completion of the course students will be able to
CO1. Conduct experiments on Position Control with proper tuning of P, PI and PID controller.
CO2. Demonstrate Lead-Lag Compensators.
CO3. Investigate the response of a Real Time System using State Variable Analysis.
CO4. Analyse Performance of Discrete-Time System an Non-Linear System.

Course Name: Data Base Management System Laboratory
Course Code: EE 694A
Course Outcomes: On completion of the course students will be able to
CO1. Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.
CO2. Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.
CO3. Differentiate between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.
CO4. Analyse database system concepts and apply normalization to the database.
CO5. Apply and create different transaction processing and concurrency control applications.

Course Name: Embedded Systems Laboratory
Course Code: EE 694B
Course Outcomes:
CO1. Familiarization with PIC Microcontroller, ARM Microcontroller, FPGA and their interfacing.
CO2: An understanding of the operation of counters and registers an understanding of the operation of multiplexers, decoders.

CO3. Design different circuits in FPGA platform.
CO4. Design of different types real time projects with digital controllers.

Course Name: Software Engineering Laboratory
Course Code: EE 694C
Course Outcomes:
CO1. To handle software development models through rational method.
CO2. To prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO3. To Develop function oriented and object oriented software design using tools like rational rose.
CO4. To perform unit testing and integration testing.
CO5. To apply various white box and black box testing techniques.

Course Name: Electrical Drives
Course Code: EE 701
Course Outcome: After successful completion of the course students will be able to
CO1: Understand the characteristics of electric motors required for a particular drive.

CO2: Interpret the concept of selection of motor power rating.

CO3: Illustrate different types of braking and speed-control of electric motors for various applications.

CO4: Justify power electronic converters for various kinds of drive operations.

Course Name: Object Oriented Programming using JAVA
Course Code: EE 702A
Course Outcomes: At the end of the course, the student will be able to
CO1: Design the process of interaction between Objects, classes & methods w.r.t. Object Oriented Programming.
CO2: Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java.
CO3: Analyze various activities of different string handling functions with various I/O operations.
CO4: Discuss basic code reusability feature w.r.t. Inheritance, Package and Interface.
CO5: Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

Course Name: Big Data Analysis
Course Code: EE 702B
Course Outcomes: At the end of the course, the student will be able to
CO1: Identify the difference between structured, semi-structured and unstructured data.
CO2: Summarize the challenges of big data and how to deal with the same.
CO3: Explain Hardtop Ecosystem.
CO4: Identify the difference between Pig and Hive.

Course Name: Digital Image Processing
Course Code: EE 702C
Course Outcomes: At the end of the course, the student will be able to
CO1: Explain the structure of human eye, image formation, Brightness, sensing and acquisition, storage, Processing, Communication, Display Image Sampling and quantization, spectrum analysis.
CO2: Illustrate image Enhancement in the Spatial and Frequency Domain, image transformations, Histogram processing, time and Spatial filtering.
CO3: Evaluate Image and video Data Compression, Redundancies.
CO4: Develop Morphological Processed Image using Dilation, Erosion, Opening, closing, Hit -or-miss transformation.
CO5: Evaluate Image Segmentation by detection of discontinuities, Edge linking and Boundary detection, Thresholding, Image Representation schemes, Boundary descriptors, and Regional descriptors.

Course Name: Power System – III
Course Code: EE 703A
Course Outcomes: At the end of the course, the student will be able to

CO1: Understand the advance knowledge in the domain of modern and industrial oriental power systems.

CO2: Implement fundamentals and concepts to analyze, formulate and solve complex problems of electrical power systems.

CO3: Analyze various power systems components, models and their operation, optimization of cost criteria.

CO4: Testingadvanced techniques, skills and modern scientific and engineering tools for professional practice for power system to enhanced power system performance.

Course Name: Restructured Electrical Power System
Course Code: EE 703B
Course Outcomes: At the end of the course, the student will be able to

CO1: Understand the need for restructuring of Power Systems, discuss different market models, different stakeholders and market power.
CO2: Understand and generalize the functioning and planning activities of Independent System Operator (ISO).
CO3: Understand transmission open access pricing issues and congestion management.
CO4: Define transfer capability and estimate the transfer capability of small power systems with numerical examples.
CO5: Define ancillary services and understand reactive power as ancillary service and **management** through synchronous generator.

Course Name: Computer Applications in Power System
Course Code: EE 703C
Course Outcomes: At the end of the course, the student will be able to

CO1: Develop proper mathematical models for analysis of a selected problem like load flow study or fault analysis.
CO2: Prepare the practical input data required for load flow or fault calculations.
CO3: Select and identify the most appropriate algorithm for load–flow and short circuit studies.
CO4: Develop power system software for static power system studies.

Course Name: Power System Dynamics and Control
Course Code: EE 704A
Course Outcomes: At the end of the course, the student will be able to

CO1: Understand the problem of power system stability and its impact on the system.
CO2: Analyse linear dynamical systems and use of numerical integration methods.
CO3: Understand the methods to improve stability.
CO4: Interpret the concept of modeling of synchronous machines and associated controllers.

Course Name: Power Quality and FACTS
Course Code: EE 704B
Course Outcomes: At the end of the course, the student will be able to

CO1: Understanding the working principles of FACTS devices and their operating characteristics.
CO2: Interpreting the characteristics of ac transmission and the effect of shunt and series reactive compensation.
CO3: Illustrating the basic concepts of power quality.
CO4: Analyzing the working principles of devices to improve power quality.

Course Name: HVDC Transmission Systems
Course Code: EE 704C
Course Outcomes: At the end of the course, the student will be able to

CO1: Describe HVDC converters and HVDC transmission.
CO2: Formulate and solve mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC links.
CO3: Analyze the different harmonics generated by the converters and their variation with the change in firing angles.
CO4: Distinguish the nature of faults on the converters and their protection schemes.
CO5: Demonstrate the existing HVDC systems along with MTDC systems and modern transmission system.

Course Name: Industrial and Financial Management
Course Code: HU 703
Course Outcomes: At the end of the course, the student will be able to

CO1: Explain and describe various technology-based business models and the dynamics of value creation, value proposition, and value capture in industrial enterprises.

CO2: Select, interpret and use different costing techniques as a basis for decisions in various business situations.

CO3: Understand the basic principles of financial accounting and reporting.

CO4: Explain how the industrial company markets and price it's products considering GST.

Course Name: Electrical Drives Laboratory
Course Code: EE 791
Course Outcomes: On completion of the course students will be able to
CO1: Apply power electronic converters for motor speed control.
CO2: Analyze the characteristics of electric motors for different type of loads.
CO3: Interpret the concept by experiment of braking of D.C. and A.C. motor.
CO4: Combine the use of computer-based simulation tools relevant to electrical Drives with practical laboratory experimentation.

Course Name: Object Oriented Programming Laboratory
Course Code: EE 792A
Course Outcomes: On completion of the course students will be able to

CO1: Create the procedure of communication between Objects, classes & methods.

CO2: Understand the elementary facts of Object Orientation with various characteristics as well as several aspects of Java.

CO3: Analyze distinct features of different string handling functions with various I/O operations.

CO4: Discuss simple Code Reusability notion w.r.t. Inheritance, Package and Interface.

CO5: Apply Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

Course Name: Big Data Analysis Laboratory
Course Code: EE 792B
Course Outcomes: On completion of the course students will be able to

CO1: Process big data using Hadoop framework.

CO2: Build and apply linear and logistic regression models.

CO3: Perform data analysis with machine learning methods.

CO4: Perform graphical data analysis.

CO5: Implement clustering techniques.

Course Name: Digital Image Processing Laboratory
Course Code: EE 792C
Course Outcomes: On completion of the course students will be able to

CO1: Build knowledge on Digital Imaging fundamentals and Digital Image Transform.

CO2: Understanding Digital Image enhancement techniques in spatial and frequency domain.

CO3: Explaining the requirements and types of Image Compression and its standards.
CO4: Demonstrate the Digital Image Restoration and Segmentation of Digital Images.
CO5: Build ideas on Edge detection techniques and concepts on Digital Image security.

Course Name: Wind and Solar Energy Systems
Course Code: EE 801A
Course Outcome: After successful completion of the course students will be able to
CO1: Analyze the fundamental principle of wind and solar power generation.
CO2: Categorize different types wind generators and solar power plants.
CO3: Understand the concept of grid integration of wind and solar power.
CO4: Apply power electronic interfaces for wind and solar generation.

Course Name: Utilization of Electric Power
Course Code: EE 801B
Course Outcome: After successful completion of the course students will be able to
CO1: Demonstrate the working of traction motor and their control under different working conditions.
CO2: Anlyze illumination level for a given application and select the suitable specification for installation.
CO3: Illustrate the working of Electric Heating, welding processes.
CO4: Explain the process of electrolysis.

Course Name: Line Commutated and Active Rectifiers
Course Code: EE 801C
Course Outcomes: After successful completion of the course students will be able to
CO1: Analyse controlled rectifier circuits.
CO2: Understand the operation of line-commutated rectifiers – 6 pulse and multi-pulse configurations.
CO3: Understand the operation of PWM rectifiers – operation in rectification and regeneration modes and lagging, leading and unity power factor model.
CO4: Interpret the concept of AC-DC flyback converter.

Course Name: Advanced Electric Drives
Course Code: EE 802A
Course Outcome: After successful completion of the course students will be able to
CO1: Analyze the operation of power electronic converters and their control strategies.
CO2: Constructthe modelling of AC motors in different reference frames.
CO3: Understand the vector control strategies for ac motor drives.
CO4: Understand the operations of permanent magnet and switched reluctance motor drive.

Course Name: Control Systems Design
Course Code: EE 802B
Course Outcomes: At the end of the course, student will be able to

CO1: Understand various design philosophy of classical controllers.

CO2: Analysis of conventional and robust controllers satisfying the desired specifications.

CO3: Interpret the concept of Lyapunov's stability and optimal control.

CO4: Design of optimal and non-linear controllers.

Course Name: Industrial Electrical System
Course Code: EE 802C
Course Outcomes: At the end of the course, student will be able to

CO1: Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.

CO2: Understand various components of industrial electrical systems.

CO3: Analyze and select the proper size of various electrical system components.

CO4: Analyze the automation of industrial electrical systems.

Course Name: Principles of Management
Course Code: HU 801
Course Outcomes: At the end of the course, student will be able to

CO1: Recall and identify the relevance of management concepts.

CO2: Apply management techniques for meeting current and future management challenges faced by the organization

CO3: Compare the management theories and models critically to solve real life problems in an organization.

CO4: Apply principles of management in order to execute the role as a manager in an organization.

Course Name: Essence of Indian Knowledge Tradition
Course Code: MC 804
Course Outcomes: At the end of the course, student will be able to

CO1: Identify the concept of Traditional knowledge and its importance.

CO2: Explain the connection between Modern Science and Indian Knowledge System.

CO3: Understand the importance of Yoga for health care.

CO4: Interpret the effect of traditional knowledge on environment.

Department of Electrical Engineering

COURSE OUTCOMES OF R (21)

Course Name: Chemistry – I

Course Code: CH101

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

CO1. Describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table
CO2. Apply fundamental concepts of thermodynamics in different engineering applications.
CO3. Apply the knowledge of water quality parameters, corrosion control & polymers to different industries.
CO4. Determine the structure of organic molecules using different spectroscopic techniques.
CO5. Evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

Course Name: Mathematics – I

Course Code: M101

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

CO1. Recall the properties and formula related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series.
CO2. Determine the solutions of the problems related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series.
CO3. Apply the appropriate mathematical tools of matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series for the solutions of the problems.
CO4. Analyze different engineering problems linked with matrix algebra, differential calculus, multivariable calculus, vector calculus.

Course Name: Basic Electrical Engineering

Course Code: EE101

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

CO1. Understand and analyze basic electric circuits
CO2. Study the working principles of electrical machines.
CO3. Introduce the components of low voltage electrical installations.
CO4. Study the fundamentals of Electrical Generation and Control Systems.

Course Name: Professional Communication

Course Code: HSMC101

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

CO1. Understand about and use the modalities and nuances of communicationin a workplace context.
CO2. Understand about communicating across cultures and societies.
CO3. Know about and apply the basic formats, templates of business andofficial communication.
CO4. Know about and employ formal communication modes in meetings and reports.
CO5. Know about and use objective and culturally neutral language in interpersonal and business communication.

Course Name: Chemistry – I Laboratory

Course Code: CH191

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

CO1. Operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
CO2. Analyze and determine the composition of liquid and solid samples working as an individual and also as a team member.
CO3. Analyze different parameters of water considering environmental issues.
CO4. Synthesize drug and polymer materials.
CO5. Design innovative experiments applying the fundamentals of chemistry.

Course Name: Basic Electrical Engineering LaboratoryCourse Code: EE191

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

CO1. Identify and use common electrical components.
CO2. Develop electrical networks by physical connection of various components and analyze the circuit behavior.
CO3. Apply and analyze the operational characteristics of electrical machines.
CO4. Apply and analyze the equivalent parameters, Losses, efficiency of transformers

Course Name: Engineering Graphics and Design LaboratoryCourse Code: EE191

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

CO1. Get introduced with Engineering Graphics and visual aspects of design.
CO2. Know and use common drafting tools with the knowledge of drafting standards.
CO3. Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering viewpoints.
CO4. Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

Course Name: Physics – I

Course Code: PH201

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

CO1. Describe various types of oscillating systems, mechanical resonance and its electrical equivalence.
CO2. Explain basic principles of Laser, Optical fibers and Polarization of light.
CO3. Apply superposition principle to explain interference and diffraction, formation of Lissajous figures.
CO4. Analyze different crystallographic structures according to their co- ordination number and packing factors, effect of various level of damping to an oscillating system.
CO5. Justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics and user to probability waves to represent microscopic systems.

Course Name: Mathematics – II

Course Code: M201

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

CO1. Recall the properties and formula related to ordinary differential equations, improper integral, Laplace transform and numerical techniques.
CO2. Determine the solutions of the problems related to ordinary differential equations, improper integral, Laplace transform and numerical techniques.
CO3. Apply appropriate mathematical tools of ordinary differential equations, improper integral, Laplace transform and numerical techniques for the solutions of the problems.
CO4. Analyze engineering problems by using differential equation, Laplace Transform and Numerical Methods.

Course Name: Programming for Problem Solving

Course Code: CS201

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

CO1. Understand the fundamental concept of Computer and mathematical knowledge and apply them in designing solution to engineering problem.
CO2. Understand the basic concept of C programming and use of data types/operators/input/output function for developing and implementing complete program leading to solution of mathematical and engineering problem.
CO3. Use conditional branching, iteration, recursion and formulate algorithms and programs in solving mathematical/ scientific/ engineering problem leading to lifelong learning.
CO4. Understand the concept of arrays, pointers, file and dynamic memory allocation and apply it for problem solving and also create new data types using structure, union and enum.
CO5. Understand how to decompose a problem into functions and assemble into a complete program by means of modular programming possibly as a team.

Course Name: Physics – I Laboratory

Course Code: PH291

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

CO1. Demonstrate experiments allied to their theoretical concepts.
CO2. Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer.
CO3. Participate as an individual and as a member or leader in groups in laboratory sessions actively.
CO4. Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.
CO5. Design solutions for real life challenges.

Course Name: Professional Communication LaboratoryCourse Code: HSMC291

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

CO1. Understand advanced skills of Technical Communication in English through Language Laboratory.
CO2. Apply listening, speaking, reading and writing skills in societal and

professional life.
CO3. Demonstrate the skills necessary to be a competent Interpersonal communicator.
CO4. Analyze communication behaviours.
CO5. Adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

Course Name: Workshop and Manufacturing Practices LaboratoryCourse

Code: ME291

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

CO1. Identify and operate various hand tools related to variety ofmanufacturing operations
CO2. Safely fabricate simple components with their own hands.
CO3. Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
CO4. Produce small devices of their interest for project or research purpose.

Course Name: Programming for Problem Solving Laboratory

Course Code: CS291

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

CO1. Understand and propose appropriate command or function in running system or developing program for engineering and mathematical problems depending on the platform used even in changed environment leading to their lifelong learning.
CO2. Identify and propose appropriate data type, arithmetic operators, input/output functions and also conditional statements in designing effective programs to solve complex engineering problem using modern tools.
CO3. Design and develop effective programs for engineering and mathematical problems using iterative statements as well as recursive functions using modular programming approach possibly as a team maintaining proper ethics of collaboration.
CO4. Explain and organize data in arrays, strings and structures and manipulate them through programs and also define pointers of different types and use them in defining self-referential structures and also to construct and use files for reading and writing to and from leading to solution of engineering and mathematical problem.
CO5. Prepare laboratory reports on interpretation of experimental results and analyze it for validating the same maintaining proper ethics of collaboration.

Course Name: Electromagnetic Fields

Course Code: EE(PH)301

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

CO1. Explain electromagnetic wave propagation using fundamentals ofelectrostatics, magneto statics and electromagnetic theory.
CO2. Apply vector calculus in problems of electrostatics and magneto statics and attainment of electromagnetic wave equation.
CO3. Analyze the physics of various kinds of electric and magnetic materials
CO4. Justify the emergence of magnetic field under time varying electric field using Maxwell's 4th equation.

Course Name: Engineering Mechanics

Course Code: EE(ME)301

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

CO1. To understand representation of force, moments for drawing free-body diagrams and analyze friction-based systems in static condition
CO2. To locate the centroid of an area and calculate the moment of inertia of a section.
CO3. Apply of conservation of momentum & energy principle for particle dynamics and rigid body kinetics
CO4. Understand and apply the concept of virtual work, rigid body dynamics and systems under vibration.

Course Name: Electrical Circuit Analysis

Course Code: EE301

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

CO1. Understand the basic concepts of electric, magnetic and filter circuits.
CO2. Synthesize different electrical circuits with network theorems.
CO3. Apply advanced mathematical methods such as Laplace and Fourier transforms along with linear algebra and differential equations techniques for solving circuit problems.
CO4. Analyze two port circuit behaviors.

Course Name: Electrical and Electronic Measurement

Course Code: EE302

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

CO1. Understand the operating principles of electrical and electronicmeasuring instruments.
CO2. Identify and measure various physical parameters using appropriate measuring instruments.
CO3. Measure various electrical parameters.
CO4. Understand statistical data analysis and computerized data acquisition.

Course Name: Semiconductor Devices and Circuits

Course Code: EE303

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

CO1. Apply the knowledge of solid state devices principles to analyze electronic circuits.
CO2. Understand amplifiers under different configurations and study their responses.
CO3. Demonstrate the switching and amplification application of the semiconductor devices.
CO4. Analyze the high speed response of semiconducting devices.

Course Name: Gender Culture and Development

Course Code: HSMC302

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

CO1. Provide an analysis of the location of women in the processes of economic development; to understand what economic development is, the scales or levels at which it occurs, and the centrality of gender at every level.
CO2. Examine theoretical and conceptual frameworks for that analysis.
CO3. Reflect upon linkages between the global economy and the gendered macro and micro process of development and transitions from ‘government’ to ‘governance.’
CO4. Explain the usefulness of a rights based approach to gender justice.
CO5. Provide basis for research, practical action and policy formulation and or evaluating for evaluating directions and strategies for social change froma gender perspective.

Course Name: Electrical Circuit Analysis Laboratory

Course Code: EE391

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

CO1. Demonstrate transient analysis of electric circuits

CO2. Analysis of frequency response characteristics of Filter circuits.

CO3. Analyze signals using mathematical tools/ software

CO4. Determination of parameter of different kinds of Electrical Networks.

Course Name: Electrical and Electronic Measurement Laboratory

Course Code: EE392

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

CO1. Understand the operations of instrument transformers, bridges and different types analog and digital instruments

CO2. Apply knowledge to conduct experiment to measure of Resistance, Inductance, Capacitance, Power and Energy.

CO3. Interpreting the process of calibration and standardization of the instruments

CO4. Experiment of applications of instrument transformers in power system.

Course Name: Python Programming Laboratory

Course Code: EE394

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

CO1. Apply programming concepts in designing solution.
CO2. Analyze different dimensions of a problem and provide optimal solutions.
CO3. Evaluate and analyze different solution based on Python programming features.
CO4. Implement solutions of real-life problems in the field of Information Technology.

Course Name: Mathematics – III

Course Code: EE(M)401

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

CO1. Recall the underlying principle and properties of Fourier series, Fourier transform,

probability distribution of a random variable, calculus of complex variable, and partial differential equation.

CO2. Exemplify the variables, functions, probability distribution and differential equations and find their distinctive measures using the underlying concept of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, and partialdifferential equation.

CO3. Apply Cauchy's integral theorem and the residue theorem to find the value of complex integration, and compute the probability of real world

uncertain phenomena by identifying probability distribution that fits thephenomena.
CO4. Solve partial differential equation using method of separation of variables.
CO5. Find the Fourier series and Fourier transform of functions by organizing understandings of underlying principles and also evaluate the integral using Parseval's identity.

Course Name: Electrical Machines – I

Course Code: EE401

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

CO1. Describe the concept of magnetic circuits.

CO2. Demonstrate the operation of different types of dc machines and its applications.

CO3. Understand the equivalent circuit of Transformers, D.C. Machines, and Three-Phase Induction Motor.

CO4. Analyse the connections of transformers and its applications.

Course Name: Power Electronics

Course Code: EE402

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

CO1: Acquire knowledge about fundamental concepts and techniques used in power electronics.

CO2: Understand the use of power converters in commercial and industrial applications.

CO3: Analyze various single phase and three phase power converter circuits and understand their applications.

CO4: Identify basic requirements for power electronics based design application.

CO5: Develop skills to build, and troubleshoot power electronics circuits.

Course Name: Analog and Digital Circuits

Course Code: EE403

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

CO1. Understand the functional building blocks, characteristics and applications of Analog ICs.
CO2. Understand effects of different feedback mechanism in amplifier circuit.

CO3. Acquired knowledge about solving problems related to number systems conversions and Boolean algebra and design logic circuits using logic gates to their simplest forms using De Morgan's Theorems; Karnaugh Maps.

CO4. Design of combinational circuits and sequential circuit.

Course Name: Universal Human Values – II:Understanding Harmony

Course Code: HSMC403

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

CO1. Develop holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
CO2. Cultivate the harmony in the human being, family, society and nature/existence.
CO3. Strengthen self-reflection.
CO4. Build commitment and courage to act.

Course Name: Electrical Machines – I Laboratory

Course Code: EE491

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

CO1: Understand the various connections of three phase transformer and induction motor.

CO2: Conduct different tests on Transformers, D.C. Machines, Three-Phase Induction Motor.

CO3: Analyze the characteristics of Transformers, D.C. Machines, Three-Phase Induction Motor.

CO4: Evaluate the different operations of single phase and three phase transformers.

Course Name: Power Electronics Laboratory

Course Code: EE492

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

CO1. Analyse the response of any power electronics devices.
CO2. Troubleshoot the operation of a power electronics circuit.
CO3. Choose suitable power electronic devices for any given application.
CO4. Know how to control and convert output signal as per requirements.
CO5. Develop any power electronics circuits as needed in operation.

Course Name: Data Structures and Algorithms Laboratory

Course Code: EE494

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

CO1. Understand the concept of dynamic memory management, data types,basic data structures, and complexity analysis
CO2. Introduce the concept of data structures through ADT.

CO3. Choose the appropriate linear and non-linear data structure andalgorithm design method for a specified application design.
CO4. Analyze the complexity of the problems.

Course Name: Electrical Machines – II

Course Code: EE501

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

CO1. Describe the concept of rotating magnetic fields.

CO2. Demonstrate the operation of AC Machines.

CO3. Understand the principle of operation and know performance of synchronous machine and fractional kW motors.

CO4. Analyse performance characteristics of ac machines.

Course Name: Power Systems – I

Course Code: EE502

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

CO1. Estimate performance of Transmission Line and Distribution line.

CO2. Select line support for a particular Transmission Line.

CO3. Explain methods of active and reactive power control.

CO4. Test the reliability of different components of Transmission Line and Distribution Line.

Course Name: Control Systems – I

Course Code: EE503

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

CO1. Calculate mathematical model and transfer function of the physical systems.
CO2. Analyze the linear systems in time domain.
CO3. Illustrate the linear systems in frequency domain.
CO4. Design simple compensators and controllers for the given specifications.

Course Name: Database Management System

Course Code: EE504A

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

`CO1. Understand Database Management System, explain fundamental elements of a database management system, compare the basic concepts of relational data model, entity-

relationship model, file organization and use appropriate index structure.

CO2. Apply efficient query optimization techniques, suitable transaction management, concurrency control mechanism and recovery management techniques

CO3. Evaluate a database design and improve the design by normalization

CO4. Design entity-relationship diagrams to represent simple database application scenarios, translate entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data.

Course Name: Computer Network

Course Code: EE504B

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

CO1. Understand the network model and architecture.
CO2. Apply different networking concepts for implementing network solution.
CO3. Analyze different networking functions and features for indentifying optimal solutions.
CO4. Evaluate and implement routing algorithms for implanting solution for the real life problems.

Course Name: Artificial Intelligence

Course Code: EE504C

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

CO1. Understand various AI search algorithms (uninformed, informed,heuristic, constraint satisfaction).
CO2. Apply facts, rules, and concepts of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving.
CO3. Analyze working knowledge of reasoning in the presence of incomplete and/or uncertain information.
CO4. Evaluate and create knowledge representation, reasoning, and machine learning techniques for the solution of real-world problems.

Course Name: Renewable Energy – I

Course Code: EE505A

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

CO1. Identify the fundamental principle solar and wind power generation.
CO2. Explain the field applications of solar energy
CO3. Classify different features of solar cells and wind generators.
CO4. Apply solar and wind power integration with existing network.

Course Name: Line Commutated and Active Rectifiers

Course Code: EE505B

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

CO1. Demonstrate different converters with/without filtering circuits.
CO2. Demonstrate different filtering circuits.
CO3. Illustrate AC-DC rectification using PWM converters.
CO4. Analyze the different technique of powerquality improvement.

Course Name: Power Plant Engineering

Course Code: EE505C

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

CO1. Understand the principles of operation for different power plants.

CO2. Understand the economics of operation for different power plants.

CO3. Interpreting the concept of load curve, cold reserve, hot reserve, spinning reserve for the operation of different power plants.

CO4. Analyse the interconnection between different power plants.

Course Name: Engineering Optimization

Course Code: EE505C

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

CO1. Understand the fundamental concepts of engineering optimization. **CO2.** Design gradient based optimization method for various algorithms. **CO3.** Apply mathematics and science in engineering applications.
CO4. Understand the genetic algorithm and PSO algorithm.

Course Name: Electrical Machines – II Laboratory

Course Code: EE591

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

CO1. Describe the concept of rotating magnetic fields.

CO2. Demonstrate the operation of AC Machines.

CO3. Understand the principle of operation and know performance of synchronous machine and fractional kW motors.

CO4. Analyse performance characteristics of ac machines.

Course Name: Power Systems – I Laboratory

Course Code: EE592

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

CO1. Estimate performance of Transmission Line and Distribution line.

CO2. Select line support for a particular Transmission Line.

CO3. Explain methods of active and reactive power control.

CO4. Test the reliability of different components of Transmission Line and Distribution Line.

Course Name: Database Management System LaboratoryCourse Code: EE594A

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

CO1. Design and implement a database schema for a given problem-domain
CO2. Create and maintain tables using PL/SQL Course Outcome
CO3. Populate and query a database
CO4. Application development using PL/SQL & front end tools

Course Name: Computer Network Laboratory

Course Code: EE594B

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

CO1. Understand and apply different network commands.
CO2. Analyze different networking functions and features for implementing optimal solutions.
CO3. Apply different networking concepts for implementing network solution.
CO4. Implement different network protocols.

Course Name: Artificial Intelligence Laboratory

Course Code: EE594C

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

CO1. Understand and recognize various AI search algorithms and AI tools.
CO2. Apply the fundamentals of knowledge representation, inference and theorem proving using AI tools.
CO3. Analyze working knowledge of reasoning in the presence of incomplete and/or uncertain information.
CO4. Evaluate and create knowledge representation, reasoning, and machine learning techniques for the solutions of real-world problems.

Course Name: Microprocessor and Microcontroller

Course Code: EE601

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

CO1: Apply the knowledge of the internal architecture 8085/8086 microprocessors and 8051 for a specific application.

CO2: Analyzing various instructions related to particular programs for specific applications.

CO3: Analyzing the concept of interfacing circuits to some real time applications

CO4: Designing various microprocessor and microcontroller based systems for a specific application.

Course Name: Control Systems – II

Course Code: EE603

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

CO1: Interpreting state-variable equations for different systems.

CO2: Express and solve system equations in state-variable form (state variable models).

CO3: Examine the stability of nonlinear systems using appropriate methods.

CO4: Analyze and design of discrete time control systems using z transform.

Course Name: Big Data Analytics

Course Code: EE604A

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

CO1. Understand the fundamental concepts of big data and analytics
CO2. Understand about clustering, classification and association techniques
CO3. Summarize about stream computing.
CO4. Summarize about the research that requires the integration of largeamounts of data
CO5. Summarize about tools and practices for working with big data

Course Name: Internet of Things

Course Code: EE604B

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

CO1. Understand the basic concepts of IoT and it's architectures.
CO2. Analyze different issues in the domain of IoT and understand the practical

applications of IoT.

CO3. Evaluate and analyze different solution for the real life problems of IoT.

CO4. Apply the concepts of IoT to design different smart tools.

Course Name: Soft Computing

Course Code: EE604C

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

CO1. Understand importance of soft computing.
CO2. Remember different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.
CO3. Implement algorithms based on soft computing.
CO4. Apply soft computing techniques to solve engineering or real lifeproblems.

Course Name: Renewable Energy – II

Course Code: EE605A

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

CO1. Obtain the basic knowledge of biomass energy conversion techniques andits types with waste into useful energy conversion.

CO2. Explain bio gas generation and its impact on environment
CO3. Obtain the knowledge of basic operating principles of tidal and wave energy to design an Ocean Thermal Energy Conversion (OTEC) plant.
CO4. Understand the working principles of geothermal energy and fuel cell andits application along with estimation.

Course Name: Advanced Power Electronics

Course Code: EE605B

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

CO1. Demonstrate conventional power converters suitable for differentindustrial and domestic applications.
CO2. Demonstrate soft switched and resonant power converters suitable for power supply.
CO3. Explain different power converters suitable for high voltage applications and power quality improvement.
CO4: Understand the operations of permanent magnet and switched reluctance motor drive.

Course Name: Digital Signal Processing

Course Code: EE605D

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

CO1. Interpret the properties of discrete time signals in time domain andfrequency domain.

CO2. Demonstrate the transform- domain signal and analyze the frequency

response.

CO3. Design and implement IIR filtering operations with the real timeconstraints.

CO4. Develop a FIR filter for specific digital signal applications.

CO5. Explain finite word length effects and digital filters.

Course Name: Power System – II Laboratory

Course Code: EE692

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

CO1. Demonstrate the performance of different types of relays.

CO2. Determine polarity, ratio and magnetization characteristics of CT and PT.

CO3. Demonstrate AC and DC load flow by simulation.

CO4. Design different protection schemes for transformer, generator, motorand feeder by simulation.

CO5. Determine economic load dispatch of a power plant.

Course Name: Electrical Workshop

Course Code: PR691

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

CO1. Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.

CO2. Develop software packages or applications and implement these for the actual needs of the community/industry.

CO3. Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.

CO4. Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.

Course Name: Electric Drives

Course Code: EE701

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

CO1: Understand the characteristics of electric motors required for a particular drive.

CO2: Interpret the concept of selection of motor power rating.

CO3: Illustrate different types of braking and speed-control of electric motors for various applications.

CO4: Justify power electronic converters for various kinds of drive operations.

Course Name: Introduction to Smart Grid

Course Code: EE702

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

CO1. Describe the necessity and evolution of smart grid with policies. **CO2.** Apply theoretical concepts for analyzing the performance of the grid.
CO3. Understand Smart Grid design, operation and control.
CO4. Discuss on two-way power flow of distribution system.

Paper Name: Energy Conversion & Storage

Paper Code: EE703A

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

CO1. Understand of energy storage and conversion technologies which are rapidly growing in necessity for large-scale integration of renewable energy.
CO2. Understanding of principles of operation of modern devices for electrochemical energy conversion and storage.
CO3. Understand battery applications in energy conversion systems.
CO4. Understand the basic principles of Renewable Energy technology, Micro Fuel Cell Technology, Micro Fluid System and Battery Charger.

Paper Name: Power Quality

Paper Code: EE703B

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

CO1. Understand the basic concepts of power quality.
CO2. Understand the working principles of devices to improve power quality.
CO3. Describe power quality characteristics as per IEEE/IEC standards.
CO4. Understand voltage sag and interruption.
CO5. Describe methods to reduce over voltages.

Paper Name: Design of Electric Apparatus

Paper Code: EE703C

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

CO1. Determine electric and magnetic field strengths and their effects in and around electrical machinery, including effects of magnetic induction on moving parts.
CO2. Design stator and rotor parts of the d.c machines, Cage rotor Induction

m/c, Wound rotor Induction m/c and Synchronous m/c and predict theperformance of the corresponding machine using design values.

CO3. Design a transformer and estimates its performance as per the requirements and constraints specified.

CO4. Design a component or a product applying all the relevant standards with realistic constraints

Paper Name: Distributed Generation and Micro gridsPaper

Code: EE704A

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

CO1. Understanding comparative studies of the conventional and non-conventional power generation.

CO2. Analyse and design of distributed generation, installation and grid integration.

CO3. Design the dc and ac micro-grid.

CO4. Analyse power quality issues and control operation of micro grid.

Paper Name: FACTS and HVDC

Paper Code: EE704B

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

CO1. Study the applications of FACTS Controllers in ac power flow.

CO2. Discuss the principles, operation and control of Series, Shunt and unified controller.

CO3. Explain the HVDC concepts, application of HVDC systems in bulk powertransmission.

CO4. Classify the DC links and describe the operation of various MTDC systems.

Paper Name: Electrical Energy Conservation and Auditing

Paper Code: EE704C

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

CO1. Learn about Energy Conservation and its benefits
CO2. Learn Life Cycle costing of Electrical Appliances
CO3. Learn about Energy auditing
CO4. Learn about Supply and Demand Side Management
CO5. Learn about the role of Smart Grid and Energy Control Centers.

Paper Name: Electrical Drives Laboratory

Paper Code: EE791

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

CO1: Apply power electronic converters for motor speed control.

CO2: Analyze the characteristics of electric motors for different type of loads.

CO3: Interpret the concept by experiment of braking of D.C. and A.C. motor.

CO4: Combine the use of computer-based simulation tools relevant to electrical Drives with practical laboratory experimentation.

Paper Name: Computer-Aided Electrical Drawing Laboratory

Paper Code: EE792

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

CO1. Read out the concept of electrical drawing for any system.
CO2. Understand the working of thesystem and its components.
CO3. Find the important points in the circuit diagrams or layout for troubleshooting and maintenance.
CO4. Use graphic software to draw the circuit for various types of electrical systems.

Paper Name: Renewable Energy Management and sustainabilityPaper

Code: EE801A

Course Outcome: After successful completion of the course students will be able to

CO1. Ability to develop thorough understanding of Renewable energy resources like solar energy, wind energy, tidal energy etc.
CO2. Ability to apply skills and knowledge and demonstration of specialized competencies in Energy System.
CO3. Analysis Renewable Energy Technology, Advanced Energy Technologies, Energy Management and Efficiency, etc.
CO4. Ability to develop and implement original and creative ideas to ensure qualitative Energy Management and Sustainable Development.

Paper Name: Electrical and Hybrid Vehicles

Paper Code: EE801B

Course Outcome: After successful completion of the course students will be able to

CO1. Explain basic terminologies associated with vehicle dynamics, schemes

for energy storage and propulsion.

CO2. Demonstrate different drive train topologies and power converter topologies for EVs.

CO3. Discuss different energy storage technologies used for hybrid electric vehicles and their control.

CO4. Analyze various electric drives suitable for hybrid electric vehicles.

Paper Name: Restructured Power System

Paper Code: EE802A

Course Outcome: After successful completion of the course students will be able to

CO1. Understand the need for restructuring of Power Systems,
CO2. Understand and generalize the functioning and planning activities of Independent System Operator (ISO) and to define ancillary services and understand reactive power as ancillary service.
CO3. Understand transmission open access pricing issues and congestion management, define transfer capability and estimate the transfer capability.
CO4. Analyze differentmarket models, different stakeholders and market power.

Paper Name: Illumination Engineering

Paper Code: EE802C

Course Outcome: After successful completion of the course students will be able to

CO1. Analyse the fundamentals of illumination and its measurements with different apparatus.

CO2. Explain the characteristics of various types of lamp with their accessories and their control circuits.

CO3. Interpreting the concept of illumination control and control circuits for the energy conservation.

CO4. Demonstrate the interior and exterior lighting.

Paper Name: Power System Operation and Control

Paper Code: EE802D

Course Outcome: After successful completion of the course students will be able to

CO1. To get an overview of system operation and control.
CO2. To understand & model power-frequency dynamics and to design power- frequency controller.
CO3. To acquire knowledge on the reactive power-voltage and different methods of control for maintaining voltage profile against varying system load.
CO4. To Design SCADA and its application for real time operation.

Paper Name: Bio-Medical Instrumentation

Paper Code: EE803A

Course Outcome: After successful completion of the course students will be able to

CO1. Understand the origin of bio potentials and its propagations
CO2. Understand the different types of electrodes and its placement for various recordings
CO3. Design bio amplifier for various physiological recordings
CO4. Analyze the different measurement techniques for non-physiological parameters

Paper Name: Blockchain

Paper Code: EE803B

Course Outcome: After successful completion of the course students will be able to

CO1. Understand the basic concepts of blockchain and it's architectures.
CO2. Analyze different issues in the domain of blockchain and understand the practical applications of blockchain.
CO3. Evaluate and analyze different solutions for the real life problems relatedto the blockchain.
CO4. Apply the concepts of blockchain to design large scale distributed and secure data storage systems.

Paper Name: Image ProcessingPaper

Code: EE803C

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

CO1. Familiarize with Digital Image characteristics, its representation indifferent domain.
CO2. Analyze digital image enhancement techniques in spatial and frequency domain.
CO3. Analyze the performance of image compression, segmentation andsecurity.
CO4. Apply image processing algorithms in different applications and solve problems.