PROGRAM OUTCOMES (POS)

Engineering Graduates will be able to:

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

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

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

4. 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.

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

6. 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.

7. 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.

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

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

10. 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.

11. 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.

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

PROGRAM SPECIFIC OUTCOMES

PSO 1: Provide effective solutions in the fields of Power Electronics, Power Systems and Electrical Machines using MATLAB/MULTISIM.

PSO 2: Design and Develop various Electrical and Electronics Systems, particularly Renewable Energy Systems.

PSO 3: Demonstrate the overall knowledge and contribute for the betterment of the society.

COURSE OBJECTIVES AND OUTCOMES (COS)

Course Name: Complex variables and Transforms

Course Objectives:

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Course Outcomes (CO): Student will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of Laplace transforms, Fourier transforms and z transforms.
- Evaluate the Fourier series expansion of periodic functions.
- Understand the use of Fourier transforms and apply z transforms to solve difference equations.

Course Name: ELECTRICAL CIRCUIT ANALYSIS

Course Objectives:

- To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.
- Knowing how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.

- To know the applications of Fourier transforms to electrical circuits excited by non sinusoidal sources.
- Study of Different types of filters, equalizers.

Course Outcomes (CO):

- Understand the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.
- To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
- Applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources are known.
- To design filters and equalizers.

Course Name: DC MACHINES & TRANSFORMERS

Course Objectives:

Student will be able to

- Study magnetic materials, electromechanical energy conversions, principle and operation of DC machines and transformers and starters.
- understand the constructional details of DC machines and Transformers
- Analyze the performance characteristics of DC machines and transformer
- Evaluate efficiency, regulation and load sharing of DC machines and transformers Design Equivalent circuit of transformer

Course Outcomes (CO):

At the end of this course, students will demonstrate the ability to

- Understand the concepts of magnetic circuits, principle and operations of DC machines, starters and single and three phase transformers
- Analyze armature reaction, parallel operation, speed control and characteristics of DC machines. Alsoanalyze the performance characteristics with the help of OC and SC tests of transformer
- Evaluate generated emf, back emf, speed, efficiency and regulations of DC machines and efficiency and regulation of transformer also load sharing of parallel connected transformers
- Design winding diagrams of DC machines and equivalent circuit of transformer.

Course Name: DIGITAL LOGIC DESIGN

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra.
- To introduce the design techniques of combinational, sequential logic circuits.
- To model combinational and sequential circuits using HDLs.

Course Outcomes (CO):

- Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using Karnaugh map.
- Make use of the concepts to solve the problems related to the logic circuits.
- Analyze the combinational and sequential logic circuits.
- Develop digital circuits using HDL, and Compare various Programmable logic devices
- Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.

Course Name: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

Course Outcomes (CO):

- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Develop the accounting statements and evaluate the financial performance of business entity.

Course Name: ELECTRICAL CIRCUIT ANALYSIS LAB

Course Objectives:

- Understand and experimentally verify various resonance phenomenon.
- Understand and analyze various current locus diagrams.
- Apply and experimentally analyze two port network parameters

Course Outcomes (CO):

- Understand and experimentally verify various resonance phenomenon.
- Understand and analyze various current locus diagrams.
- Apply and experimentally analyze two port network parameters

Course Name: DC MACHINES & TRANSFORMERS LAB

Course Objectives:

To conduct various experiments on

- DC motors and DC Generators
- The speed control techniques of DC motors.
- To conduct various experiments for testing on 1-phase transformers

Course Outcomes (CO):

- Able to conduct and analyze load test on DC shunt generator
- Able to understand and analyze magnetization characteristics of DC shunt generator
- Able to understand and analyze speed control techniques and efficiency of DC machines
- Able to understand to predetermine efficiency and regulation of single-phase Transformers

Course Name: DIGITAL LOGIC DESIGN LAB

Course Objectives:

- To understand various pin configurations of the Digital ICs used in the laboratory
- To conduct the experiments and verify the truth tables of various logic circuits.
- To analyze the logic circuits
- To design sequential and combinational logic circuits and verify their properties.
- To design of any sequential/combinational circuit using Hardware Description Language.

Course Outcomes (CO):

- Understand the pin configuration of various digital ICs used in the lab
- Conduct the experiment and verify the properties of various logic circuits.
- Analyze the sequential and combinational circuits.
- Design of any sequential/combinational circuit using Hardware/ HDL. .

Course Name: Application Development with Python

Course Objectives:

- To learn the basic concepts of software engineering and life cycle models
- To explore the importance of Databases in application Development
- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming

Course Outcomes (CO): Students should be able to

- Identify the issues in software requirements specification and enable to write SRS documents for software development problems
- Explore the use of Object oriented concepts to solve Real-life problems

- Design database for any real-world problem
- Solve mathematical problems using Python programming language

Course Name: UNIVERSAL HUMAN VALUES

Course Objectives:

The objective of the course is fourfold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Course Outcomes (CO):

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Course Name: Numerical Methods & Probability Theory

Course Objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations, the theory of Probability and random variables.

Course Outcomes (CO):

- Apply numerical methods to solve algebraic and transcendental equations
- Derive interpolating polynomials using interpolation formulae
- Solve differential and integral equations numerically
- Apply Probability theory to find the chances of happening of events.

- Understand various probability distributions and calculate their statistical constants.

Course Name: ANALOG ELECTRONIC CIRCUITS

Course Objectives:

- List various types of feedback amplifiers, oscillators and large signal Amplifiers.
- Explain the operation of various electronic circuits and linear ICs.
- Apply various types of electronic circuits to solve engineering problems
- Analyse various electronic circuits and regulated power supplies for proper understanding
- Justify choice of transistor configuration in a cascade amplifier.
- Design electronic circuits for a given specification.

Course Outcomes (CO):

- List various types of feedback amplifiers, oscillators and large signal amplifiers
- Explain the operation of various electronic circuits and linear ICs
- Apply various types of electronic circuits to solve engineering problems
- Analyze various electronic circuits and regulated power supplies for proper understanding
- Justify choice of transistor configuration in a cascade amplifier
- Design electronic circuits for a given specification

Course Name: POWER ELECTRONICS

Course Objectives:

The student will be able to:

- Understand the differences between signal level and power level devices.
- Analyze controlled rectifier circuits.
- Analyze the operation of DC-DC choppers.
- Analyze the operation of voltage source inverters.

Course Outcomes (CO):

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

- Understand the operation, characteristics and usage of basic Power Semiconductor Devices.
- Understand different types of Rectifier circuits with different operating conditions.
- Understand DC-DC converters operation and analysis of their characteristics.
- Understand the construction and operation of voltage source inverters, Voltage Controllers and Cyclo Converters.
- Apply all the above concepts to solve various numerical problem solving

Course Name: AC MACHINES

Course Objectives:

The students will be able to:

- Understand the fundamentals of AC machines, know equivalent circuit performance characteristics.
- Understand the methods of starting of Induction motors.
- Understand the methods of starting of Synchronous motors.
- Understand the parallel operation of Alternators.

Course Outcomes (CO):

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

- Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and synchronous machines.
- Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and load division of synchronous generators.
- Apply the concepts to determine V and inverted V curves and power circles of synchronous motor.
- Analyze the various methods of starting in both induction and synchronous machines.

Course Name: ELECTROMAGNETIC FIELD THEORY

Course Objectives:

- To understand the basic principles of electrostatics
- To understand the basic principles of magneto statics for time invariant and time varying fields
- To understand the principles of dielectrics, conductors and magnetic potentials

Course Outcomes (CO):

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

- Understand the concept of electrostatics
- Understand the concepts of Conductors and Dielectrics
- Understand the fundamental laws related to Magneto Statics
- Understand the concepts of Magnetic Potential and Time varying Fields

Course Name: ANALOG ELECTRONIC CIRCUITS LAB

Course Objectives:

- To learn basic techniques for the design of analog circuits and fundamental concepts used in the design of systems.
- To design and analyze multistage amplifiers, feedback amplifiers and OPAMP based circuits.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.

Course Outcomes (CO):

- Analyze various amplifier circuits.
- Design multistage amplifiers.
- Design OPAMP based analog circuits.
- Understand working of logic gates.
- Design and implement Combinational and Sequential logic circuits.

Course Name: POWER ELECTRONICS LAB

Course Objectives:

- Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
- Analyze the operation of single-phase half &fully-controlled converters and inverters with different types of loads.
- converters with different loads.
- Create and analyze various power electronic converters using PSPICE software.

Course Outcomes (CO):

By the end of the course the student will be able to:

- Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
- Analyze the operation of single-phase half &fully-controlled converters and inverters with different types of loads.
- Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cycloconverters with different loads.
- Create and analyze various power electronic converters using PSPICE software.

Course Name: AC MACHINES LAB

Course Objectives:

- Analyze and apply load test, no-load and blocked-rotor tests for construction of circle
- diagram and equivalent circuit determination in a single-phase induction motor.
- Predetermine regulation of a three-phase alternator by synchronous impedance &m.m.f methods.
- Predetermine the regulation of Alternator by Zero Power Factor method Xd and Xq
- determination of salient pole synchronous machine.
- Evaluate and analyze V and inverted V curves of 3 phase synchronous motor

Course Outcomes (CO):

By the end of the course, the student will be able to:

- Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single phase induction motor.
- Predetermine regulation of a three-phase alternator by synchronous impedance &m.m.f methods.
- Predetermine the regulation of Alternator by Zero Power Factor method Xd and Xq determination of salient pole synchronous machine.
- Evaluate and analyze V and inverted V curves of 3 phase synchronous motor

Course Name: CIRCUITS SIMULATION AND ANALYSIS USING PSPICE

Course Objectives:

- Simulation of various circuits using PSPICE software.
- Simulation of single-phase half & fully-controlled converters, and inverters
- Simulation of single-phase AC Voltage controllers with different loads.

Course Outcomes (CO):

By the end of the course, the student will be able to:

- Simulation of various circuits using PSPICE software.
- Simulation of single-phase half & fully-controlled converters, and inverters
- Simulation of single-phase AC Voltage controllers with different loads.

Course Name: Design Thinking for Innovation

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes (CO):

- Define the concepts related to design thinking.
- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

Course Name: POWER SYSTEM ARCHITECTURE

Course Objectives:

- Operation of Conventional Power generating systems and their components.
- The role of non-conventional power generating systems and their operation and economic aspects.
- Calculation of different transmission line parameters and their use.
- Modeling of transmission line and evaluation of constants.

Course Outcomes:

- Remember and understand the concepts of conventional and nonconventional power generating systems.
- Apply the economic aspects to the power generating systems.
- Analyse the transmission lines and obtain the transmission line parameters and constants.
- Design and develop the schemes to improve the generation and capability of transmission line to meet the day-to-day power requirements.

Course Name: CONTROL SYSTEMS

Course Objectives:

- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response, time domain specifications and the concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modelling of Control system

Course Outcomes:

- Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis
- Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
- Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

Course Name: MEASUREMENTS & SENSORS

Course Objectives:

- The student has to acquire knowledge about:
- The basic principles of different types of electrical instruments for the measurement of voltage, current, power factor, power and energy.
- The measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements
- The principle of working of CRO and its applications

Course Outcomes:

- Able to Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and distribution sectors

- Able to analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements.
- Analyse the different operation of extension range ammeters and voltmeters, DC and AC bridge for measurement of parameters and different characteristics of periodic and aperiodic signals using CRO.
- Design and development of various voltage and current measuring meters and the varieties of issues coming up in the field of electrical measurements.

Course Name: POWER ELECTRONICS DRIVES

Course Objectives:

- To understand the various drive mechanisms and methods for energy conservation.
- To apply power electronic converters to control the speed of DC motors and induction motors.
- To evaluate the motor and power converter for a specific application.
- To develop closed loop control strategies of drives

Course Outcomes:

- Understand the various drive mechanisms and methods for energy conservation.
- Apply power electronic converters to control the speed of DC motors and induction motors.
- Evaluate the motor and power converter for a specific application.
- Develop closed loop control strategies of drives

Course Name: POWER QUALITY

Course Objectives:

- To learn about voltage disturbances and power transients that is occurring in power systems.
- To know about voltage sag and transient over voltages for quality of power supply
- To understand about harmonics and their mitigation
- To study about different power quality measuring and monitoring concepts.
- To know about long duration voltage variations

Course Outcomes:

- Understand the basic concepts of different power quality issues and to mitigate them, principles of regulation of long duration voltage variations
- Analyze voltage disturbances and power transients that are occurring in power systems.
- Understand the concept of harmonics in the system and their effect on different power system equipment.

- Apply the knowledge about different power quality measuring and monitoring concepts.

Course Name: CONTROL SYSTEMS LAB

Course Objectives:

- Determination of transfer functions of various systems and control of it by different methodologies.
- To provide knowledge in the analysis and design of controllers and compensators.
- The characteristics of servo mechanisms which are helpful in automatic control systems.
- To know the stability analysis using MATLAB.

Course Outcomes:

- Get the knowledge of feedback control and transfer function of DC servo motor.
- Model the systems and able to design the controllers and compensators.
- Get the knowledge about the effect of poles and zeros location on transient and steady state behavior of second order systems and can implement them to practical systems and MATLAB
- Determine the performance and time domain specifications of first and second order systems.

Course Name: MEASUREMENTS AND SENSORS LAB

Course Objectives:

This laboratory deals with the practical exercises for:

- Calibration of various electrical measuring instruments
- Accurate determination of inductance and capacitance using AC Bridges
- Measurement of coefficient of coupling between two coupled coils
- Measurement of resistance for different range of resistors using bridges

Course Outcomes:

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

- Calibrate various electrical measuring instruments
- Accurately determine the values of inductance and capacitance using AC bridges
- Compute the coefficient of coupling between two coupled coils
- Accurately determine the values of very low resistances

Course Name: SOFT SKILLS

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To develop leadership skills and organizational skills through group activities

- To function effectively with heterogeneous teams

Course Outcomes (CO):

- Memorize various elements of effective communicative skills
- Interpret people at the emotional level through emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building
- Judge the situation and take necessary decisions as a leader
- Develop social and work-life skills as well as personal and emotional well-being

Course Name: POWER SYSTEM ANALYSIS

Course Objectives:

- The use of per unit values and graph theory concepts, solving a problem using computer.
- Formation of Y_{bus} and Z_{bus} of a Power System network, power flow studies by various methods.
- Different types of faults and power system analysis for symmetrical and also unsymmetrical faults.
- Analysis of power system for steady state and transient stability and also methods to improve stability

Course Outcomes:

- Remember and understand the concepts of per unit values, Y Bus and Z bus formation, load flow studies, symmetrical and unsymmetrical fault calculations.
- Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution and experiment some of these methods using modern tools and examine the results.
- Analyse the symmetrical faults and unsymmetrical faults and done the fault calculations, analyse the stability of the system and improve the stability. Demonstrate the use of these techniques through good communication skills.
- Develop accurate algorithms for different networks and determine load flow studies and zero, positive and negative sequence impedances to find fault calculations.

Course Name: DIGITAL COMPUTING PLATFORMS

Course Objectives:

- Architecture and designing of 8086 Microprocessor with Assembling language programming and interfacing with various modules

- Understand the Interfacing of 8086 with various advanced communication devices
- Designing of 8051 Microcontroller with Assembling language programming and interfacing with various modules
- To know about Assembly Language Programs for the Digital Signal Processors and usage of Interrupts
- To understand Xilinx programming and understanding of Spartan FPGA board

Course Outcomes:

- Understand the basic architecture & pin diagram of 8086 microprocessor, 8051 Microcontroller, DSP Processor and FPGA Processors
- Apply the concepts to design Assembly language programming to perform a given task, Interrupt service routines for all interrupt types
- Design Real time applications by writing Assembly Language Programs for the Digital Signal Processors, Xilinx programming for Spartan FPGA boards and use Interrupts for real-time control applications
- Analyse various real time systems by using various controllers

Course Name: DIGITAL SIGNAL PROCESSING

Course Objectives:

- To describe discrete time signals and systems.
- To teach importance of FFT algorithm for computation of Discrete Fourier Transform.
- To expose various implementations of digital filter structures.
- To present FIR and IIR Filter design procedures.
- To outline need of Multi-rate Processing.

Course Outcomes:

- Formulate difference equations for the given discrete time systems
- Apply FFT algorithms for determining the DFT of a given signal
- Compare FIR and IIR filter structures
- Design digital filter (FIR & IIR) from the given specifications

Course Name: HVDC AND FACTS

Course Objectives: To get the student exposed to:

- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various FACTS devices

Course Outcomes:

- Understand the necessity of HVDC systems as emerging transmission networks
- Understand the necessity of reactive power compensation devices
- Design equivalent circuits of various HVDC system configurations

- Design and analysis of various FACTS devices

Course Name: POWER SYSTEMS ANALYSIS LAB

Course Objectives:

The objectives of this course include

- To do the experiments (in machines lab) on various power system concepts like determination of sequence impedance, fault analysis, finding of subtransient reactance's.
- To draw the equivalent circuit of three winding transformer by conducting a suitable experiment.
- To develop the MATLAB program for formation of Y and Z buses. To develop the MATLAB programs for Gauss-Seidel and fast decoupled load flow studies.
- To develop the SIMULINK model for single area load frequency problem.

Course Outcomes:

After completion of the course the student will able to

- Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's.
- Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
- Get the knowledge on development of MATLAB program for formation of Y and Z buses.
- Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.
- Get the knowledge on development of SIMULINK model for single area load frequency problem.

Course Name: DIGITAL COMPUTING PLATFORMS LAB

Course Objectives:

- Write Assembly language programming on 8086 Microprocessors
- To Interface various devices with 8086
- To develop MASAM Programming
- For Interfacing of 8051 Microcontroller with its peripheral devices.

Course Outcomes:

- Understand the basic concepts to write assembly language programming on 8086 Microprocessors.
- Design various device configurations and Interfacing of various devices with 8086.
- Understand the basic concepts to write programming on 8051 Microcontroller.
- Design various Interfacing circuitry with 8051 Microcontroller with its peripheral

devices

Course Name: BASIC ELECTRICAL CIRCUITS

Course Objectives: To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and
- Various combinations of these parameters.
- The Single Phase AC circuits and concepts of real power, reactive power, complex
- power, phase angle and phase difference
- Series and parallel resonances, bandwidth, current locus diagrams
- Network theorems and their applications
- Network Topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree.

Course Outcomes:

- After completing the course, the student should be able to do the following
- Given a network, find the equivalent impedance by using network reduction techniques and determine the current through any element and voltage across and power through any element.
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc,.
- Apply the network theorems suitably.
- Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit. Also understand various basic definitions and concepts.

Course Name: SEMICONDUCTOR DEVICES AND CIRCUITS

Course Objectives:

- To study the characteristics of various types of semiconductor devices.
- To apply the characteristics of semiconductor devices to develop engineering solutions.
- To analyze functioning of various types of electronic devices and circuits.

Course Outcomes:

- List various types of semiconductor devices (L1)
- Study the characteristics of various types of semiconductor devices (L2)
- Apply the characteristics of semiconductor devices to develop engineering solutions (L3)
- Analyse functioning of various types of electronic devices and circuits (L4)

Course Name: BIOLOGY FOR ENGINEERS

Course Objectives: To provide basic understanding about life and life Process.

- Animal and plant systems. To understand what biomolecules, are, their structures are functions. Application of certain biomolecules in Industry.
- Brief introduction about human physiology and bioengineering.

- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Course Outcomes:

- After studying the course, the student will be able to:
- Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- Briefly about human physiology.
- Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- Know about application of biological Principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

Course Name: ELECTRONIC CIRCUITS LAB

Course Objectives:

- To learn basic techniques for the design of analog circuits, digital circuits and fundamental concepts used in the design of systems.
- To design and analyze multistage amplifiers, feedback amplifiers and OP AMP based circuits.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Analyze various amplifier circuits.
- Design multistage amplifiers.
- Design OPAMP based analog circuits.
- Understand working of logic gates.
- Design and implement Combinational and Sequential logic circuits.

Course Name: ENVIRONMENTAL SCIENCE

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes:

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.
- To know about the wild life protection and forest conservation acts.

Course Name: ENGLISH LANGUAGE SKILLS

Course Objectives:

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

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

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

Course Name: ELECTRICAL MACHINE DESIGN

Course Objectives: The student will be able to:

- Know about various principles of design factors, ratings based on heating and cooling of electrical machines
- Know about designing of DC machines along with windings
- Understand about overall designing of 1-ϕ transformer
- Be able to know about designing of Induction machine along with winding configurations
- Able to know about designing of Synchronous machines

Course Outcomes: The student will be able to:

- Understand various design factors, types of windings, choice of machine, selection and ratings
- Able to design DC machine based on specified rating
- Able to design 1-ϕ transformer based on specified rating
- Able to design 3-ϕ Induction machine based on specified rating
- Able to design 3-ϕ Synchronous machine based on specified rating

Course Name: ENGLISH LANGUAGE SKILLS LAB

Course Objectives:

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes:

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Course Name: RESEARCH METHODOLOGY

Course Objectives : The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

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

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read. comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Course Name: SIGNALS AND SYSTEM

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.

- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

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

- Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques. (L1)
- Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L2)
- Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods. (L3)
- Classify the systems based on their properties and determine the response of them. (L4)

Course Name: CONSTITUTION OF INDIA

COURSE OBJECTIVES : The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

Course Outcomes:

At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Course Name: RENEWABLE ENERGY SYSTEMS

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

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

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

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

Course Name: Mathematics III

Course Objectives: This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.
Course Outcomes: The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods

Course Name: ELECTRICAL CIRCUITS- II

Course Objectives: To make the students learn about:

- How to determine the transient response of R-L, R-C, R-L-C series circuits for D.C. and A.C. excitations
- The analysis of three phase balanced and unbalanced circuits
- How to measure active and reactive power in three phase circuits
- Applications of Fourier transforms to electrical circuits excited by no sinusoidal sources
- Study of Network topology, Analysis of Electrical Networks, Duality and Dual Networks
- Different types of filters and equalizers

Course Outcomes (CO): After completing the course, the student should be able to do the following:

- Determine the transient response of R-L, R-C, R-L-C circuits for D.C. and A.C. Excitations

- Analyze three phase balanced and unbalanced circuits and determine line Voltages, line currents, phase voltages and phase currents
- Measure active and reactive power consumed by a given three phase circuit
- Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
- Analysis of electrical networks, duality and dual networks
- Design different types of filters
- Simulate D.C. Circuits

Course Name: ELECTRICAL MACHINES – I

Course objectives: To make the students learn about:

- The constructional features of DC machines and different types of windings employed in DC machines
- The phenomena of armature reaction and commutation
- Characteristics of generators and parallel operation of generators
- Methods for speed control of DC motors and applications of DC motors
- Various types of losses that occur in DC machines and how to calculate efficiency
- Testing of DC motors

Course outcomes:

- After completing the course, the student should be able to do the following:
- Calculate the e.m.f. generated on open circuit and find terminal voltage on load
- Diagonise the failure of DC generator to build up voltage
- Compute the load shared by each generator when several generators operate in parallel
- Determine the gross torque and useful torque developed by DC motor
- Identify suitable method and conditions for obtaining the required speed of DC motor
- Calculate the losses and efficiency of DC generators and motors

Course Name: CONTROL SYSTEMS ENGINEERING

Course objectives: To make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effects of feedback
- The use of block diagram algebra and Mason's gain formula to find the effective transfer function between two nodes
- Transient and steady state responses, time domain specifications
- The concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- The fundamental aspects of modern control.

Course outcomes:

- Compute the steady state errors and transient response characteristics for a given system and excitation
- Determine the absolute stability and relative stability of a system
- Draw root loci After completing the course, the student should be able to do the following:
- Evaluate the effective transfer function of a system from input to output using block diagram reduction techniques (ii) Mason's gain formula
- Design a compensator to accomplish desired performance
- Derive state space model of a given physical system and solve the state Equation

Course Name: ELECTRONIC DEVICES AND CIRCUITS

Course objectives: To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT,FET,MOSFET, characteristics of special purpose electronic devices. To familiarize students with dc biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.

Course outcomes: Upon completion of the course, students will:

- Analyze the operating principles of major electronic devices, its characteristics and applications.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design and analyze basic transistor amplifier circuits using BJT and FET.

Course Name: ELECTRIC CIRCUITS SIMULATION LABORATORY

Course objectives:

- To understand the various electric circuit concepts through circuit simulation using PSPICE software
- To know performance of RLC series and parallel circuits through simulation studies
- To know the analysis of 3-phase balanced and unbalanced circuits by simulation
- To understand the occurrence of transients in electric circuits with both DC and AC excitations

Course outcomes:

The student should be able to do the following at the end of the lab course:

- Explain electric circuit concepts by interpreting the simulation results
- Design RLC series circuit for specified frequency response

- Analyze three phase balanced and unbalanced circuits
- Design RL, RC and RLC circuits for specified transient response

Course name: ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Outcomes:

- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

Course name: MATHEMATICS –IV

Course objectives: To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.

Course Outcomes:

The student achieves the knowledge to analyse the problems using the methods of special functions and complex variables

Course name: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.
Course Outcomes: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

Course name: ELECTRICAL MACHINES – II

Course objectives:

- To make the student learn about:
- Constructional details of transformer and its operation (i) on no load (ii) on
- load
- Predetermination of regulation and efficiency of transformer from OC and SC
- test results
- Parallel operation of transformers
- Constructional details, principle of operation and the importance of slip in
- Induction motor operation
- The slip-torque characteristics and torque calculations of Induction motor

- Methods of starting and speed control of Induction motor

Course Outcomes:

After completing the course, the student should be able to do the following:

- Draw the equivalent circuit of transformer
- Conduct O.C, S.C tests and predetermine the regulation and efficiency of
- transformer
- Compute the load shared by each transformer when several transformers
- operate in parallel
- Draw the circle diagram of a three phase Induction motor and predetermine
- the performance characteristics
- Determine the starting torque, maximum torque, slip at maximum torque

Course name: ELECTRICAL POWER GENERATING SYSTEMS

Course objectives:

To make the student learn about:

- Structure, essential components and their layout in thermal power station
- Selection of site for thermal power station
- Selection of site for hydro power generation
- Various aspects and issues involved in Nuclear power generation
- Electric power generation from renewable energy sources as sun, wind and
- ocean
- Cost of generation and tariff methods

Course Outcomes: After completing the course, the student should be able to do the following:

- Estimate the coal requirement, cost per kWh generation and number of units
- generated for thermal power station
- Estimate the required flow of river water, cost of generation and number of units generated in Hydel power generation
- Compute various factors like load factor, plant factor
- Evaluate the tariffs to be charged for the consumers
- Plot the load curve, load duration curve and hence determine the load capacity of the plant

Course name: ELECTROMAGNETIC FIELDS

Course objectives: To make the student learn about:

- The laws concerning static electric fields: Coulomb's law, Gauss law; the laws

- concerning static magnetic fields: Biot-savart law, Ampere circuital law
- The equations concerned with static electric fields
- The equations concerned with static magnetic fields
- The difference between the behaviors of conductors and dielectrics in electric
- fields
- The energy stored and energy density in (i) static electric field (ii) magnetic
- field
- Electric dipole and dipole moment, magnetic dipole and dipole moment

Course Outcomes: After going through this course the student acquires:

- Knowledge on basic principles, concepts and fundamental laws of electromagnetic fields.
- The knowledge to understand 3-dimensional co-ordinate systems, electrostatics, magneto statics, time-varying fields and interaction between electricity and magnetism.
- The knowledge to calculate the quantities associated with uniform plane wave motion in different media of transmission

Course name: ANALOG ELECTRONIC CIRCUITS

Course objectives: The aim of this course is to familiarize the student with the analysis and design of basic transistor amplifier circuits, Oscillators, Multi-vibrators and wave shaping.

Course Outcomes: On completion of this course the student will be able to understand the

- Methods of biasing transistors & Design of simple amplifier circuits. band analysis of amplifier circuits using small - signal
- equivalent circuits to determine gain, input impedance and output impedance.
- Method of calculating cutoff frequencies and to determine bandwidth.
- Design and analyse different Oscillator circuits.

Course name: ELECTRICAL MACHINES LABORATORY - I

OBJECTIVES: The student has to learn about:

- No load and load characteristics of DC generators
- Various tests on DC motors
- The speed control techniques of DC motors

OUTCOMES: The student should be able to do the following:

- Conduct experiments to obtain the no-load and load characteristics of D.C. Generators
- Conduct tests on D.C. motors for predetermination of efficiency

- Conduct tests on D.C. motors for determination of efficiency
- Control the speed of D.C. motor in a given range using appropriate method
- Identify the reason as to why D.C. Generator is not building up voltage

Course name: CONTROL SYSTEMS AND SIMULATION LABORATORY

OBJECTIVES:

- The objectives of this lab course are to make the student practically learn about the effects of feedback on system performance
- Determination of transfer functions of DC Machine.
- The design of controllers/compensators to achieve desired specifications.
- The characteristics of servo mechanisms used in automatic control applications.

Course Name: ELECTRICAL MEASUREMENTS

Course Objectives:

- The basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.
- The measurement of R, L, and C parameters using bridge circuits.
- The principles of magnetic measurements.
- The principle of working of CRO and its applications.
- The use of Current Transformers, Potential Transformers, and Potentiometers.

Course Outcomes (CO): The student should have learnt how to

- Use wattmeter's, pf meters, and energy meters in a given circuit.
- Extend the range of ammeters and voltmeters
- Measure active power, reactive power, power factor, and energy in both 1-phase and 3-phase circuits
- Determine the resistance values of various ranges, L and C values using appropriate bridges.
- Analyze the different characteristic features of periodic, and aperiodic signals using CRO.
- Use CTs and PTs for measurement of very large currents and high voltages

Course Name: LINEAR & DIGITAL IC APPLICATIONS

Course Objectives:

- To make the student understand the basic concepts in the design of electronic circuits using linear integrated circuits and their applications. To introduce some special function ICs.
- To be able to use computer-aided design tools for development of complex digital logic circuits
- To be able to model, simulate, verify, analyze, and synthesize with hardware description languages
- To be able to design and prototype with standard cell technology and programmable

logic
- To be able to design tests for digital logic circuits, and design for testability

Course Outcomes (CO):

- Upon completion of the course, students will be able to:
- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyze the linear, non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.
- Able to use computer-aided design tools for development of complex digital logic circuits.
- Able to model, simulate, verify, analyze, and synthesize with hardware description languages.
- Able to design and prototype with standard cell technology and programmable logic.
- Able to design tests for digital logic circuits, and design for testability.

Course Name: ELECTRICAL POWER TRANSMISSION SYSTEMS

Course Objectives:

The objectives of the course are to make the student learn about

- The computation of the parameters of a Transmission line.
- Classification of transmission lines and representation by suitable equivalent circuits
- The various factors that affect the performance of Transmission lines
- The Travelling wave phenomenon on transmission lines.
- Underground cables: construction, types, and grading

Course Outcomes (CO):

At the end of the course the student will be able to

- Compute the transmission line parameters.
- Model a given transmission line.
- Estimate the performance of a given transmission line.
- Analyze the effect of over voltages on transmission lines.
- Explain the construction, types and grading of underground cables and analyze cable performance.

Course Name: POWER ELECTRONICS

Course Objectives:

The objectives of the course are to make the student learn about

- The basic power semiconductor switching devices and their principles of operation.
- The various power conversion methods, controlling and designing of power converters.
- The applications of Power electronic conversion to domestic, industrial, aerospace, commercial and utility systems etc.
- The equipment used for DC to AC, AC to DC, DC to Variable DC, and AC to Variable frequency AC conversions.

Course Outcomes (CO):

- After going through this course, the student acquires knowledge about:
- Basic operating principles of power semiconductor switching devices.
- The operation of power electronic converters, choppers, inverters, AC voltage controllers, and cycloconverters, and their control.
- How to apply the learnt principles and methods to practical applications.

Course Name: ELECTRICAL MACHINES – III

Course Objectives:

The objectives of the course are to make the student learn about

- The construction and principle of working of synchronous machines
- Different methods of predetermining the regulation of alternators
- The concepts and computation of load sharing among alternators in parallel.
- The performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement.
- Different types of single-phase motors and special motors used in house hold appliances and control systems.

Course Outcomes (CO):

- At the end of the course the student will be able to
- Predetermine the regulation of synchronous generators using different methods.
- Determine how several alternators running in parallel share the load on the system.
- Analyze the performance characteristics of synchronous motors.
- Make necessary calculations for power factor improvement using synchronous condenser.
- Choose specific 1-phase motor and/or special motors for a given application

Course Name: NETWORKS SIGNALS AND SYSTEMS

Course Objectives:

The objectives of the course are to make the students learn about

- Basic characteristics of circuit elements
- How to compute two port parameters
- Study of graph theory and analysis of electrical networks
- Application of Laplace transforms to analyse the frequency response
- Application of Fourier transforms to electrical circuits excited by non-sinusoidal sources.

Course Outcomes (CO):

- Given network, find the equivalent impedance by the concept of two port network
- Analyse the frequency response of electrical network using Laplace transform

- Apply concepts of Fourier series to simply the electrical network
- Synthesize the network using network functions

Course Name: ELECTRICAL MACHINES LABORATORY – II

Course Objectives:

- To experiment in detail on Transformers, Induction Motors, Alternators and Synchronous Motors, and evaluate their performance characteristics.

Course Outcomes (CO):

- After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of important A.C equipment like transformers, Induction Motors, Alternators and Synchronous Motors.
- The student should also have acquired the knowledge about the fixation of the rating of transformers, induction motors and synchronous machines

Course Name: ELECTRICAL MEASUREMENTS LABORATORY

Course Objectives:

The objectives of the course are to make the students learn about:

- Calibration of various electrical measuring/recording instruments.
- Accurate determination of resistance, inductance and capacitance using D.C and A.C Bridges.
- Measurement of parameters of choke coil

Course Outcomes (CO):

- At the end of the course, the student will be able to
- Calibrate various electrical measuring/recording instruments.
- Accurately determine the values of inductance and capacitance using a.c bridges
- Accurately determine the values of very low resistances
- Measure reactive power in 3-phase circuit using single wattmeter
- Determine ratio error and phase angle error of CT

Course Name: MANAGEMENT SCIENCE

Course Objectives:

The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.

Course Outcomes (CO):

This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient management decisions on physical and human resources of an organization. Beside the knowledge of Management Science facilitates for his/her personal and professional development

Course Name: POWER SEMICONDUCTOR DRIVES

Course Objectives:

The objectives of the course are to make the students learn about:

- The operation of electric motor drives controlled by power electronic converters.
- The stable steady-state operation and transient dynamics of a motor-load system.
- The operation of the chopper fed DC drive.
- The distinguishing features of synchronous motor drives and induction motor drives.

Course Outcomes (CO):

The student should be able to:

- Identify the choice of the electric drive system based on their applications
- Explain the operation of single and multi quadrant electric drives
- Analyze single phase and three phase rectifiers fed DC motors as well as chopper
- fed DC motors
- Explain the speed control methods for AC-AC & DC-AC converters fed to Induction
- motors and Synchronous motors with closed loop, and open loop operations.

Course Name: POWER SYSTEM PROTECTION

Course Objectives:

The objectives of the course are to make the students learn about:

- The different types of electromagnetic relays and microprocessor based relays
- The protection of Generators
- The protection of Transformers
- The protection of feeders and lines
- The technical aspects involved in the operation of circuit breakers
- Generation of over voltages and protection from over voltages

Course Outcomes (CO):

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

- Explain the principles of operation of various types of electromagnetic relays,
- Static relays as well as Microprocessor based relays
- Understanding the protection of generators and determination of what %
- generator winding is unprotected under fault occurrence
- Understanding the protection of transformers and make design calculations to
- determine the required CT ratio for transformer protection
- Explain the use of relays in protecting Feeders, lines and bus bars
- Solve numerical problems concerning the arc interruption and recovery in
- circuit breakers
- Understand why over voltages occur in power system and how to protect the system

Course Name: MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

- Learning of MICROPROCESSORS AND MICROCONTROLLERS functions

Course Outcomes (CO):

- Understand
- Do programming with 8086 microprocessors
- Program MSP 430 for designing any basic Embedded System
- Design and implement some specific real time applications
- Using MSP 430 low power microcontroller.

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Course Name: POWER SYSTEM ANALYSIS

Course Objectives: The objectives of the course are to make the students learn about:

- Y bus and Z bus of a Power System network
- Power flow studies by various methods.
- Short circuit analysis of power systems.
- Swing equation and its solution
- Equal area criterion and its applications

Course Outcomes (CO):

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

- Form the Z_{bus} and Y_{bus} of a given power system network
- Compare different methods used for obtaining load flow solution
- Conduct load flow studies on a given system
- Make fault calculations for various types of faults
- Determine the transient stability by equal area criterion
- Determine steady state stability power limit
- Distinguish between different types of buses used in load flow solution

Course Name: NEURAL NETWORKS & FUZZY LOGIC

Course Objectives:

The objectives of the course are to make the students learn about:

- Importance of AI techniques in engineering applications
- Artificial Neural network and Biological Neural Network concepts
- ANN approach in various Electrical Engineering problems
- Fuzzy Logic and Its use in various Electrical Engineering Applications

Course Outcomes (CO):

The students should acquire awareness about:

- Approaches and architectures of Artificial Intelligence
- Artificial Neural Networks terminologies and techniques
- Application of ANN to Electrical Load Forecasting problem, Control system problem

- Application of ANN to System Identification and Pattern recognition
- The development of Fuzzy Logic concept
- Use of Fuzzy Logic for motor control and AVR operation
- Use of Fuzzy Logic controller in an 18 bus bar system

Course Name: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Course Objectives:

- To experiment in detail on Learning of Microprocessors and Microcontrollers functions

Course Outcomes (CO):

- 1. Do programming with microprocessors
- 2. Understand concepts of Intel x86 series of processors
- 3. Program MSP 430 for designing any basic Embedded System
- 4. Program and implement some specific real time applications Using MSP 430 low power microcontroller.

Course Name: POWER ELECTRONICS AND SIMULATION LABORATORY

Course Objectives: The student will understand:

- The characteristics of power electronic devices with gate firing circuits Various forced commutation techniques
- The operation of single-phase voltage controller, converters and Inverters circuits with R and RL loads
- Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators

Course Outcomes (CO): Student should be able to:

- Test the turn on –turn off characteristics of various power electronic devices.
- Test and analyze firing circuits for SCRs
- Test different types of voltage controllers, converters and Inverters with R and RL loads
- Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators

Course Name: ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB (Audit Course)

Course Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students‟ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Course Outcomes (CO):
The proposed course should be a laboratory course to enable students to use „good" English and perform the following:

- Gathering ideas and information and to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

Course Name: ELECTRICAL DISTRIBUTION SYSTEMS

Course Objectives: The student has to acquire knowledge about:

- The classification of distribution systems
- The technical aspects and design considerations in DC and AC distribution systems and their comparison
- Technical issues of substations such as location, ratings and bus bar arrangements
- The causes of low power factor and methods to improve power factor
- The principles in Distribution automation

Course Outcomes (CO): Student should be able to:

- Compute the various factors associated with power distribution
- Make voltage drop calculations in given distribution networks
- Learn principles of substation maintenance
- Compute power factor improvement for a given system and load
- Understand implementation of SCADA for distribution automation

Course Name: DIGITAL SIGNAL PROCESSING

Course Objectives: learning of Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems.

Course Outcomes (CO):

At the end of the course, the student should be able to:

- Formulate engineering problems in terms of DSP tasks.
- Apply engineering problems solving strategies to DSP problems.
- Design and test DSP algorithms.
- Analyze digital and analog signals and systems.
- Encode information into signals.

- Design digital signal processing algorithms.
- Design and simulate digital filters.
- Analyze and compare different signal processing strategies.

Course Name: POWER SYSTEM OPERATION AND CONTROL

Course Objectives:
The objectives of the course are to make the students learn about:

- Optimum generation allocation
- Hydrothermal scheduling
- Modeling of turbines and generators
- Load frequency control in single area and two area systems
- Reactive power compensation in power systems
- Power system operation in competitive environment

Course Outcomes (CO):
After completion of the course, the student will able to:

- Develop the mathematical models of turbines and governors
- Address the Load Frequency Control problem
- Explain how shunt and series compensation helps in reactive power control
- Explain the issues concerned with power system operation in competitive environment

Course Name: UTILIZATION OF ELECTRICAL ENERGY

Course Objectives:
The objectives of the course are to make the students learn about:

- The laws of illumination and their application for various lighting schemes
- Principles and methods for electric heating and welding.
- Systems of electric traction, study of traction equipment, mechanics of train movement and associated calculations.

Course Outcomes (CO):
Student should be able to:

- Develop a lighting scheme for a given practical case.
- Analyze the performance of Heating and Welding methods
- Make all numerical calculations associated with electric traction.
- Assess the economic aspects in utilization of electrical energy

Course Name: ENERGY AUDITING & DEMAND SIDE MANAGEMENT

Course Objectives:
The objectives of this course include

- To learn about Energy Auditing.
- To learn about Energy Measuring Instruments.
- To understand the Demand Side Management.

Course Outcomes (CO):

After completion of the course the student should be able to:

- Conduct energy auditing and evaluate energy audit results
- Carry out motor energy audit
- Analyze demand side management concepts through case study

Course Name: POWER QUALITY

Course Objectives:

The objectives of the course are to make the students learn about:

- Power quality issues and standards.
- The sources of power quality disturbances and power transients that occur in
- power systems.
- The sources of harmonics, harmonic indices, Devices for controlling harmonic
- distortion.
- The principle of operation of DVR and UPQC.

Course Outcomes (CO):

After completion of the course the student should be able to:

- Address power quality issues to ensure meeting of standards
- Apply the concepts of compensation for sags and swells using voltage
- regulating devices
- Assess harmonic distortion and its mitigation.
- Explain the power measurement data according to standards.

Course Name: DIGITAL SIGNAL PROCESSING LABORATORY

Course Objectives:

- Formulate engineering problems in terms of DSP tasks

Course Outcomes (CO):

- Able to design real time DSP systems and real world applications.
- Able to implement DSP algorithms using both fixed and floating point processors.

Course Name: POWER SYSTEMS AND SIMULATION LABORATORY

Course Objectives:

The objectives of this course include:

- Experimental determination (in machines lab) of sequence impedance and subtrasient reactance's of synchronous machine
- Conducting experiments to analyze LG, LL, LLG, LLLG faults

- The equivalent circuit of three winding transformer by conducting a suitable experiment.
- Developing MATLAB program for formation of Y and Z buses.
- Developing MATLAB programs for gauss-seidel and fast decoupled load flow studies.
- Developing the SIMULINK model for single area load frequency control problem.

Course Outcomes (CO):

At the end of the lab course, the student should be able to do the following:

- Experimental determination (in machines lab) of sequence impedance and subtrasient reactances of synchronous machine
- Conducting experiments to analyze LG, LL, LLG, LLLG faults
- The equivalent circuit of three winding transformer by conducting a suitable experiment.
- Developing MATLAB program for formation of Y and Z buses.
- Developing MATLAB programs for gauss-seidel and fast decoupled load flow studies.
- Developing the SIMULINK model for single area load frequency control problem.

Course Name: INSTRUMENTATION

Course Objectives:

The objectives of the course are to make the students learn about:

- Common errors that occur in measurement systems, and their classification
- Characteristics of signals, their representation, and signal modulation techniques
- Methods of Data transmission, telemetry, and Data acquisition.
- Working principles of different signal analyzers and Digital meters.
- Several types of transducers and their use for measurement of non-electrical
- quantities.

Course Outcomes (CO): The student should be able to:

- Identify and explain the types of errors occuring in measurement systems
- Differentiate among the types of data transmission and modulation techniques
- Apply digital techniques to measure voltage, frequency and speed
- Choose suitable transducers for the measurement of non-electrical quantities

Course Name: HVDC TRANSMISSION

Course Objectives: The objectives of the course are to make the students learn about:

- Technical and economic aspects of HVAC and HVDC transmission and their comparison.
- Static power converters
- Control of HVDC converter systems
- Origin, effects, classification and elimination of harmonics
- The occurrence of faults, and transients in HVDC system and their protection.

Course Outcomes (CO):

After Completion of Course, the student should be able to:

- Compare HVDC and HVAC transmission systems
- Understand the operation of various converters used in HVDC transmission
- systems
- Devise means to suppress / eliminate harmonics.
- Design HVDC and AC Filters
- a load frequency control problem.