GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

Sub: BASIC ELECTRICAL ENGINEERING

CO_1: Implement principles of DC network, theorems and transients.
CO_2: Analyze the concept of Single phase AC Circuits.
CO_3: Analyze the concept of Three phase AC Circuits.
CO_4: Express the concept of magnetic circuit and DC machines.
CO_5: Apply basic principles of AC machines and their working.
CO_6: Demonstrate basic principles of power system

Sub: NETWORK THEORY

CO_1: Apply network theorems for the analysis of electrical circuits.
CO_2: Obtain the transient and steady-state response of electrical circuits.
CO_3: Analyze the steady-state response of single-phase and three-phase circuits using sinusoidal excitation.
CO_4: Understand coupled circuits.
CO_5: Apply Laplace Transformation for network analysis and realize its behavior.
CO_6: Analyze two port circuits and network functions.

Sub: ELECTRICAL MACHINE - I

CO_1: Understand the concepts of magnetic circuits.
CO_2: Understand the operation of Electromagnetic force and Torque.
CO_3: Analyze the differences in operation of different dc machine configurations.
CO_4: Cultivate critical thinking skills by evaluating the performance of DC generator.
CO_5: Understand the operation of DC motor.
CO_6: Analyze single phase and three phase transformers circuits.

Sub: POWER ELECTRONICS

CO_1: Gain a comprehensive understanding of the working principles & V-I characteristics of diodes, thyristors, MOSFETs, and IGBTs.
CO_2: Develop the ability to design and analyze single-phase full-bridge and three-phase full- bridge thyristor rectifiers, taking into account resistive and highly inductive loads.
CO_3: Acquire proficiency in analyzing the power circuit of a Buck converter and deriving waveforms at steady state, considering various operating conditions.
CO_4: Explore various techniques to optimize the efficiency and performance of Boost converters, including considerations of switching frequency and component selection.
CO_5: Master the analysis and design of single-phase Voltage Source Inverters, including the selection of modulation techniques, calculation of modulation indices, and prediction of output voltage characteristics for practical applications.
CO_6: Effectively analyze and design three-phase Voltage Source Inverters, integrating switch states and sinusoidal modulation techniques for practical implementation.

Sub: ELECTROMAGNETIC THEORY

CO_1: Foundation of classical electromagnetism and are crucial for understanding the behavior of electric and magnetic fields.
CO_2: Analyze electromagnetic fields with sinusoidal variation over time using Maxwell's Equations.
CO_3: Fundamental in the study of electromagnetic waves, their interactions with different materials, and their propagation characteristics in various mediums.
CO_4: To design control systems that exhibit desirable stability, accuracy, disturbance rejection, insensitivity and robustness properties.
CO_5: To design and tune PID controllers and compensators for feedback control systems.
CO_6: To analyze, design, and control dynamic systems using state space representation.

Sub: ELECTRIC POWER TRANSMISSION AND DISTRIBUTION

CO_1: Gain knowledge about the historical evolution of power systems and conventional sources of electrical energy.
CO_2: Develop skills in calculating inductance and capacitance in different transmission line setups.
CO_3: Acquire the ability to analyze and design efficient transmission lines, considering factors like voltage profiles and mechanical design.
CO_4: Understand fault analysis techniques in power systems and compute fault currents accurately.
CO_5: Learn about the classification and characteristics of distribution systems and apply voltage regulation methods effectively.
CO_6: Master concepts related to underground cables and power system earthing for safe and reliable distribution networks.

Sub: CONTROL SYSTEM

CO_1: To analyze, design, and implement control systems in industrial settings, utilizing mathematical modeling.
CO_2: To analyze, design, and evaluate the performance of control systems.
CO_3: To analyze and design control systems in both the time and frequency domains.
CO_4: To design control systems that exhibit desirable stability, accuracy, disturbance rejection and insensitivity and robustness properties.
CO_5: To design and tune PID controllers and compensators for feedback control systems.
CO_6: To analyze, design, and control dynamic systems using state space representation.

Sub: ELECTRICAL MACHINE - II

CO_1: To impart knowledge on construction features of AC machine.
CO_2: To understand the principle of constant, pulsating and rotating magnetic field.
CO_3: To impart knowledge on Construction, principle of operation of induction machines.
CO_4: Familiarity with the principles and operation of special machines such as single-phase motors, stepper motors, and reluctance motors.
CO_5: Ability to analyze and solve problems related to the steady-state and dynamic behavior of Alternator.
CO_6: Analyze the behavior of Synchronous motor at different loading conditions using V and inverted V curve.

Sub: SMART GRID

CO_1: Understand the evolution and key concepts of smart grids, including their architecture and functions.
CO_2: Differentiate between conventional and smart grids, and assess the need, opportunities, and challenges of smart grid implementation.
CO_3: Understand the principles and functions of Phasor Measurement Units and Wide Area Measurement Systems and their role in enabling wide-area protection and control.
CO_4: Evaluate the need for micro-grids and their application in enhancing grid resilience and analyze challenges and solutions to interconnecting micro-grids with the main grid.
CO_5: Analyze the integration of variable speed wind generators, fuel cells, and micro-turbines into the grid, including the advantages and disadvantages of distributed generation.
CO_6: Evaluate the impact of renewable energy sources on power quality and electromagnetic compatibility in smart grids and explore power quality conditioners for micro-grids, web-based power quality monitoring and power quality audit methodologies.

SUB: ELECTRICAL MACHINE DESIGN:

CO_1: Understanding Transformer Design Principles.
CO_2: Capable of applying design considerations such as flux density selection, insulation materials, and cooling methods of electrical machines across various applications.
CO_3: Students will develop problem-solving skills in electrical machine design.
CO_4: Gain knowledge on Commutator and Armature design.
CO_5: Competent in designing three-phase induction motors.
CO_6: Able to determine main dimensions, select appropriate winding configurations and optimize magnetic circuits for characteristics of Synchronous Machine.

Sub: RENEWABLE POWER GENERATION SYSTEM:

CO_1: Ability to create awareness about renewable Energy Sources & technologies.
CO_2: Ability to acquire knowledge about solar heat energy.
CO_3: Ability to recognize current and possible future role of solar PV Cell.
CO_4: Ability to explain the wind energy conversion and their applications.
CO_5: Ability to understand basics about biomass energy.
CO_6: Ability to acquire knowledge about Hybrid energy.

Sub: POWER SYSTEM OPERATION AND CONTROL

CO_1: Perform per unit calculations in power system.
CO_2: Apply the concept of single line diagram for three phase system and solve the load flow problem using iterative methods.
CO_3: Investigate the constraints in load dispatch and plan economic operation of power system through unit commitment and economic load dispatch.
CO_4: Develop the model of ALFC and analyze the system response for single and multi-area power system.
CO_5: Recognize the concept of steady state and transient stability.
CO_6: Acquire knowledge to perform power system stability analysis using equal area criterion method and applying numerical solutions to swing equations.

Sub: ELECTRICAL POWER SYSTEM PROTECTION

CO_1: Understand the various schemes available in current protection.
CO_2: Have knowledge on Transformer & Bus bar protection.
CO_3: Attain knowledge about Distance and Carrier protection of transmission lines.
CO_4: Understand the concepts of Generator protection.
CO_5: Attain knowledge on numerical protection Scheme.
CO_6: Learners will understand the concepts of relays.