Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	207006	Engineering Mathematics-III	CO1: Solve higher order linear differential equation using appropriate techniques to model and analyze electrical circuits. CO2: Apply Integral transforms such as Laplace transform, Fourier transform and Z-Transform to solve problems related to signal processing and control systems. CO3: Apply Statistical methods like correlation, regression and Probability theory as applicable to analyze and interpret experimental data related to energy management, power systems, testing and quality control. CO4: Perform Vector differentiation and integration, analyze the vector fields and apply to wave theory and electro-magnetic fields. CO5: Analyze Complex functions, conformal mappings, and perform contour integration in the study of electrostatics, signal and image processing
Electrical Engineering	203141	Power Generation Technologies	CO1: Explain basics of thermodynamics, cycles and elaborate working various components of thermal power plant with all accessories. CO2: Identify components and elaborate operation of various components, layout, location, environmental and social issues of nuclear, diesel and gas power plant. CO3: Explain the components of hydro power plant and calculation of turbine required, hydrological graphs. CO4: Demonstrate and the importance of wind-based energy generation along with its design, analysis and comparison. CO5: Use of solar energy in thermal and electrical power generation applications considering energy crisis, environmental and social benefits. CO6: Understand the operation and demonstrate of electrical energy generation using biomass, tidal, geothermal, fuel cell and interconnection with grid.
Electrical Engineering	203142	Material Science	CO1: Categorize and classify different dielectric materials from Electrical Engineering applications point of view. CO2: Summarize properties and characteristics of different classes of insulating material and determine its breakdown strength with experimentation. CO3: Classify magnetic materials and elaborate applications and latest manufacturing technologies. CO4: Choose conducting materials for application in various electrical equipment. CO5: Apply the knowledge of nanotechnology, batteries and solar cell materials for various applications. CO6: Test and measure dielectric loss tangent, strength of solid, liquid and gaseous insulating material and flux density as per IS.
Electrical Engineering	203143	Analog and Digital Electronics	CO1: : Understand conversion of number system, perform binary arithmetic and reduce Boolean expressions by K- Map CO2: Demonstrate basics of various types of Flip flops, design registers and counter. CO3: Apply and Analyze applications of OPAMP in open and closed loop condition. CO4: : Apply the knowledge of Op-amp as wave form generators , filters & Voltage regulator IC CO5: : Understand BJT as amplifier with various configurations CO6: : Design uncontrolled rectifier with given specifications

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	203144	Electrical Measurement & Instrumentation	CO1: Define various characteristic and classify measuring instruments along with range extension techniques. CO2: Apply measurement techniques for measurement of resistance and inductance. CO3: Demonstrate construction, working principle of electro- dynamo type instrument for measurement of power. CO4: Demonstrate construction, working principle of induction type instruments for measurement of energy. CO5: Make use of CRO for measurement of voltage, current and frequency and Classify transducer and apply it for measurement of physical parameters in real time. CO6: Apply measurement techniques for measurement of Level and displacement and also classify strain gauge.
Electrical Engineering	203145	Power System-I	CO1: : Recognize different patterns of load curve and calculate associated different factors with it and tariff CO2: : Draft specifications of electrical equipment in power station and detail study of overhead line insulators CO3: : Design electrical and mechanical aspects in overhead transmission and underground cables CO4: : Evaluate the inductance and capacitance of different transmission line configurations CO5: : Analyze the performance of short and medium transmission lines CO6: : Classify, model and analyze transmission line using ABCD constants
Electrical Engineering	203146	Electrical Machines-I	CO1: Evaluate the performance parameters of transformer with experimentation and demonstrate its construction along with specifications as per standards. CO2: Distinguish between various types of transformer connections as per vector groups with application and perform parallel operation of single/three phase transformers. CO3: Explain the construction and working of DC machines and induction motor. CO4: Select and draft specifications of DC machines and induction motors for various applications along with speed control methods. CO5: Justify the need of starters in electrical machines with merits and demerits. CO6: Test and evaluate performance of DC machines and induction motor as per IS standard.
Electrical Engineering	203147	Network Analysis	CO1: Developing strong basic for network theory. CO2: Develop the problem solving technique for network by application of different network theorems. CO3: Understand the behavior of network by analyzing its transient response using classical method. CO4: Understand the behavior of network by analyzing its transient response using Laplace transform. CO5: Analyze the two port network parameters and network functions. CO6: Apply knowledge of network theory foe designing special circuits like filters.
Electrical Engineering	203148	Numerical Methods & Computer Programming	CO1: Develop algorithm, draw flowchart and implement simple program using basics of C-programming. CO2: Able to use floating point algebra and techniques for high speed calculations, determine root of polynomial equation using various methods. CO3: Apply different methods for solution of algebraic and transcendental linear and nonlinear equation using appropriate numerical method and curve fitting using least square method. CO4: Apply different interpolation techniques for equally and unequally space data and numerical differentiation. CO5: Apply of different numerical methods differentiation methods for solving linear simultaneous equations and Eigen values. CO6: Apply of different numerical methods for solution of 1st order and 2nd order ordinary differential equation and numerical integration.

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	203149	Fundamental of Microcontroller and Applications	CO1: Describe the architecture and features of 8051 microcontroller. CO2: Illustrate addressing modes and execute programs in assembly language for the Micro controller. CO3: Write programs in C language for microcontroller 8051. CO4: : Elaborate interrupt structure of 8051 and program to handle interrupt and ADC809 CO5: Define the protocol for serial communication and understand the microcontroller development systems. CO6: Interface input output devices and measure electrical parameters with 8051 in real time.
Electrical Engineering	311121	Industrial and Technology Management	CO1: Differentiate between different types of business organization and discuss the fundamentals of economics and management. CO2: Explain the importance of technology management. CO3: Define quality management and its assistance tools. CO4: Describe the characteristics of marketing and its types and understand the concept of financial management. CO5: : Discuss the qualities of a good leader and concepts of group dynamics and Motivation theories CO6: Explain the importance of Intellectual property rights and understand the concept of patents, copy rights and trademarks.
Electrical Engineering	303141	Advance Microcontroller and its Applications	CO1: Explain architecture of PIC18F458 microcontroller and arithmetic logical instructions. CO2: Describe the addressing modes of PIC18 microcontroller and debug assembly language programs. CO3: Develop and debug program in C language for specific applications. CO4: Analyze CCP module and debug program in c language for CCP applications. CO5: Understand and use advance features of microcontroller peripherals effectively. CO6: Demonstrate interfacing of microcontroller to various devices.
Electrical Engineering	303142	Electrical Machines-II	CO1: Understand the construction and working of synchronous machines and ac motors. CO2: Determine the voltage regulation and efficiency of ac machines by various methods. CO3: Examine the parallel operation of alternators. CO4: Evaluate the performance of synchronous motor under variable load and excitation. CO5: Demonstrate the speed control methods of three phase induction motor. CO6: Impart various applications of ac motors.
Electrical Engineering	303143	Power Electronics	CO1: : Develop characteristics of current controlled power electronics switching devices CO2: : Develop characteristics of voltage controlled power electronics switching devices and analyze the performance & working principle of DC to DC converter for different types of load CO3: : Analyze the performance & working principle of single phase AC to DC converter for different types of load CO4: : Analyze the performance & working principle of three phase AC to DC converter & AC Voltage regulator for different types of load CO5: : Analyze the performance & working principle of transistorized based single phase DC to AC converter for different types of load CO6: : Analyze the performance & working principle of transistorized based three phase DC to AC converter

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	303144	Electrical Installation, Maintenance and Testing	CO1: Classify distribution systems, its types and select the economical conductor size for overhead system. CO2: Design of different earthing systems for residential and industrial premises. CO3: Identify the various maintenance strategies, concept of condition monitoring & its use in industry, advanced tools of condition monitoring. CO4: Select methods of condition monitoring and testing of various Electrical Equipment's. CO5: Estimate and costing of residential and industrial premises. CO6: Apply electrical safety rules and regulation in residential and industrial premises.
Electrical Engineering	303146	Power System-II	CO1: Evaluate generalized constants of transmission line, efficiency and regulation of different types of transmission lines. CO2: Solve problems involving design and performance evaluation of EHVAC power transmission lines and corona loss. CO3: Explain the concept of per unit system in a power system and Compute power flow in power transmission networks. CO4: Calculate currents and voltages in a power system under symmetrical fault condition and explain protective devices ratings, location in a power system. CO5: Calculate currents and voltages in a power system under unsymmetrical fault condition. CO6: Explain the basic concept, recent trends and control methods used in HVDC transmission.
Electrical Engineering	303147	Control System I	CO1: Differentiate between various controls system and obtain transfer function of simple mechanical and electrical systems by classical control theory. CO2: Apply standard test signals to verify time domain specification of various types of systems. CO3: Analyze stability of system in time domain technique. CO4: Calculate frequency domain specifications and find out stability by using different frequency domain techniques. CO5: : Design and tuning of P, PI and PID controller by various technique CO6: Apply of different numerical methods for solution of 1st order and 2nd order ordinary differential equation and numerical integration.
Electrical Engineering	303148	Utilization of Electrical Energy	CO1: : Analyze electric heating, welding methods and their applications CO2: : Analyze electrochemical process and electrical circuits used in refrigeration, air conditioning CO3: : Design residential illumination schemes CO4: : Understand the electrical traction system and equipment used in traction substation CO5: : Understand the traction mechanics behind the services CO6: : Describe control of traction motors, train lighting and signaling system
Electrical Engineering	303149	Design of Electrical Machines	CO1: : Calculate heating, cooling time constant & explain auxiliaries used in transformer CO2: Calculate dimensions of core, yoke, winding and main tank of transformer. CO3: : Determine the performance parameters of transformer CO4: Explain the procedure to design the stator core, slots & winding of three phase induction motor. CO5: Design of length of air-gap & rotor core, slots winding used in three phase induction motor. CO6: Calculate the performance parameters of three phase induction motor.

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	303150	Energy Audit and Management	CO1: To understand the significance of BEE Energy policies & knowledge of Electricity Acts. CO2: Demonstrate objectives, strategies & skills in energy management. CO3: Enlist energy conservation and demand side measures for electrical, thermal and utility Systems. CO4: Perform Preliminary energy audit of various sectors CO5: Solve simple problems to optimize the energy consumption. CO6: To design suitable energy monitoring system in an organization to perform cost benefit analysis.
Electrical Engineering	403141	Power System Operation and Control	CO1: Identify and analyze the dynamics of power system and suggest means to improve stability of system. CO2: Identify the effect of reactive power on Power system and suggest the suitable means of reactive power management. CO3: Identify problems in AC transmission systems & Selection of appropriate FACTs technology. CO4: Analyze the generation-load balance in real time operation for voltage-frequency control and develop automatic control strategies. CO5: Formulate objective functions for optimization task of unit commitment, economic load dispatch and design solution using computational techniques. CO6: Identify the significance of inadvertent power exchange, energy control & Evaluate reliability indices of Power system.
Electrical Engineering	403142	PLC and SCADA Applications	CO1: Explain the working and types of PLC. CO2: Classify input and output interfacing devices with PLC. CO3: Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure. CO4: Execute and test the programs developed for digital and analog operations. CO5: Describe SCADA protocols along with their architecture. CO6: Develop industrial applications using PLC and SCADA.
Electrical Engineering	403143	Elective I (Power Quality)	CO1: Apply the knowledge to differentiate between Conventional and Smart Grid. CO2: Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS. CO3: Comprehend the issues of micro grid. CO4: Solve the Power Quality problems in smart grid. CO5: Identify the need of smart substations and feeder automations. CO6: Apply the communication technology in smart grid.
Electrical Engineering	403144	Elective II (Electric and Hybrid Vehicles)	CO1: Understand the need and importance of Electric, Hybrid Electric Vehicles and Fuel cell vehicle. CO2: : Describe the performance and selection of various energy storage devices CO3: Differentiate and analyze the various battery charging and management systems. CO4: : Impart knowledge about architecture and performance of Electric and Hybrid Vehicles CO5: Classify the different drives and controls used in electric vehicles. CO6: Understand and distinguish between Vehicle to Home, Vehicle to Vehicle and Vehicle to Grid energy systems concepts.
Electrical Engineering	403145	Control System II	CO1: Recognize the importance of digital control system. CO2: Familiarize with Z-transform and Pulse-transfer-function. CO3: Analyze stability of system in digital controllers. CO4: Analyze state space analysis. CO5: Analyze Solution of state equations. CO6: Design observer for system.

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering	403147	Switchgear and Protection	CO1: Explain the purposes of protection, in relation to major types of apparatus, protection principle, dangers and criteria. CO2: Describe arc interruption methods in circuit breaker. CO3: Explain construction and working of different high voltage circuit breakers such as ACB, SF6 CB, and VCB. CO4: To understand the working principle of static and microprocessor based relays. CO5: Describe various protection schemes used for transformer, alternator and bus-bar. CO6: Describe transmission line protection schemes.
Electrical Engineering	403148	Power Electronic Controlled Drives	CO1: : Understand the basics of electrical drives and motor load dynamics, multi quadrant operation of drives CO2: : Analyze the operation of converter fed and chopper fed DC drives CO3: : Analyze the operation of inverter fed and ac voltage regulator fed AC drives CO4: : Apply vector control for induction motor drives and understand thermal model, duty cycles of motor CO5: Explain & analyze synchronous and BLDC motor drives along with its close loop control. CO6: : Choose drives for industrial applications
Electrical Engineering	403149	Elective III (High Voltage Engineering)	CO1: : Identify, describe and analyze the breakdown theories of solid, liquid and gaseous materials CO2: Explain different methods of generation of high AC, DC, impulse voltage and current. CO3: Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current. CO4: : Identify the causes of occurrence of overvoltage and apply remedial solutions CO5: Demonstrate different tests on high voltage equipment's. CO6: Design the high voltage laboratory with all safety measures.
Electrical Engineering	403150	Elective IV (Smart Grid)	CO1: Apply the knowledge to differentiate between Conventional and Smart Grid. CO2: Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS. CO3: Comprehend the issues of micro grid. CO4: Solve the Power Quality problems in smart grid. CO5: Identify the need of smart substations and feeder automations. CO6: Apply the communication technology in smart grid.