Institute of Engineering
Department of Electrical Engineering

FE Semester – I / II

FE Electrical, Course-2015	COs	Course Outcome
103004 Basic Electrical Engineering	103004.1	Understand and demonstrate the fundamentals of electromagnetism,single phase transformers, electrostatics, and A.C. and D.C. circuits.
	103004.2	Apply Concept of electromagnetism for the working of transformer.
	103004.3	Differentiate between electrical and magnetic circuits.
	103004.4	Compare between D.C. and A.C. circuits.
	103004.5	Draw the phasor diagrams for single phase and three phase A.C. circuits
	103004.6	Provide solution for the network by applying various laws and theorems.
	103004.7	Obtain solutions for electrical networks analytically and verify these results experimentally in laboratory.
	103004.8	Demonstrate the awareness on social issues like conservation of electrical energy, electrical safety etc.
	103004.9	Develop abilities to excel in competitive exams required for post graduation and research

SE Semester – I

SE Computer Course - 2015	COs	Course Outcome
203141 Power Generation Technologies	203141.1	Identify operations of thermal power plant with all accessories and cycles.
	203141.2	Be aware of the principle of operation, components, layout, location, environmental and social issues of nuclear, diesel and gas power plant.
	203141.3	Identify and demonstrate the components of hydro power plant and calculation of turbine required based on catchment area.
	203141.4	Find the importance of wind based energy generation along with its design, analysis and comparison.
	203141.5	Apply solar energy in thermal and electrical power generation considering energy crisis,environmental and social benefits.
	203141.6	Understand the operation of electrical energy generation using biomass, tidal, geothermal, hydel plants, fuel cell and interconnection with grid.
207006: Engineering Mathematics-III	207006.1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
	207006.2	Solve problems related to Laplace transform, Fourier transform, Z-Transform and applications to Signal processing and Control systems.
	207006.3	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.
	207006.4	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
203142: Material Science	203142.1	Categorize and classify different materials from Electrical Engineering applications point of view.
	203142.2	Explain and summarize various properties and characteristics of different classes of materials.
	203142.3	Choose materials for application in various electrical equipment.
	203142.4	Explain and describe knowledge of nanotechnology, batteries and solar cell materials.
	203142.5	Test different classes of materials as per IS.
203143: Analog And Digital Electronics	203143.1	Understand conversion of number system, perform binary arithmetic and reduce Boolean expressions by K- Map.
	203143.2	Demonstrate basics of various types of Flip flops, design registers and counter.
	203143.3	Analyze parameter of Op-amp and its applications.
	203143.4	Apply the knowledge of Op-amp as wave form generators & filters.
	203143.5	Use BJT as amplifier with various configurations.
	203143.6	Analysis of uncontrolled rectifier.
203144: Electrical Measurements and Instrumentation	203144.1	Understand various characteristics of measuring instruments, their classification and range extension technique.
	203144.2	Classify resistance, apply measurement techniques for measurement of resistance, inductance.
	203144.3	Explain construction, working principle and use of dynamometer type wattmeter for measurement of power under balance and unbalance condition.
	203144.4	Explain Construction, working principle of 1-phase and 3-phase induction, static energy meter and calibration procedures.
	203144.5	Use of CRO for measurement of various electrical parameters, importance of transducers, their classification, selection criterion and various applications.
	203144.6	Measurement of various physical parameters using transducers.
203151: Soft Skills	203151.1	DoSWOT analysis.
	203151.2	Develop presentation and take part in group discussion.
	203151.3	Understand andImplement etiquettes in workplace and in society at large.
	203151.4	Work in team with team spirit.
	203151.5	Utilize the techniques for time management and stress management.
203154: Audit Course I	203154.1	Differentiate between types of solar Concentrators
	203154.2	Apply software tool for solar concentrators
	203154.3	Design different types of Solar collectors and balance of plant

		SE Semester – II
203145: **Power System I**	203145.1	Recognize different patterns of load curve, calculate different factors associated with it and tariff structure for LT and HT consumers.
	203145.2	Aware of features, ratings, application of different electrical equipment in power station and selection of overhead line insulators.
	203145.3	Analyze and apply the knowledge of electrical and mechanical design of transmission lines.
	203145.4	Identify and analyze the performance of transmission lines.
203146: **Electrical** **Machines I**	203146.1	Apply energy conversion principles to different machines.
	203146.2	Select machine for specific applications.
	203146.3	Test the various machine for performance calculation.
203147: **Network Analysis**	203147.1	Developing strong basics for network theory.
	203147.2	Develop the problem solving technique for networks by application of theorems.
	203147.3	Understand the behavior of the network by analyzing its transient response.
	203147.4	Apply their knowledge of network theory for designing special circuits like filters.
203148: **Numerical** **Methods and** **Computer** **Programming**	203148.1	Develop algorithms and implement programs using C language for various numerical methods.
	203148.2	Demonstrate types of errors in computation and their causes of occurrence.
	203148.3	Identify various types of equations and apply appropriate numerical method to solve different equations.
	203148.4	Apply different numerical methods for interpolation, differentiation and numerical integration.
	203148.5	Apply and compare various numerical methods to solve first and second order ODE.
	203148.6	Apply and compare various numerical methods to solve linear simultaneous equations.
203149: **Fundamentals of** **Microcontroller** **and Applications**	203149.1	Differentiate between microprocessor and microcontroller.
	203149.2	Describe the architecture and features of various types of microcontroller.
	203149.3	Demonstrate programming proficiency using the various addressing modes and all types of instructions of the target microcontroller.
	203149.4	Program using the capabilities of the stack, the program counter the internal and external memory, timer and interrupts and show how these are used to execute a programme.
	203149.5	Write assemble assembly language programs on PC and download and run their program on the training boards.
	203149.6	Design electrical circuitry to the Microcontroller I/O ports in order to interface with external devices.
	203149.7	Write assembly language programs and download the machine code that will provide solutions real-world control problems such as fluid level control, temperature control, and batch processes.
203155: **Audit Course II** **(A)** **(B)**	203155.1	Will be able to do design of Solar PV system for small and large installations
	203155.2	Will be able to handle software tools for Solar PV systems
	203155.1	Observing the safety precautions while working
	203155.2	Test line cord for continuity with test lamp/ multimeter
	203155.3	Dismantle and reassemble an electric iron
	203155.4	Heater, kettle, room heater, toaster, hair dryer, mixer grinder etc.
	203155.5	Install a ceiling fan and the regulator
	203155.6	Check a fluorescent lamp chock, starter and install it.
	203155.7	Domestic installation testing before energizing a domestic installation

		TE Semester – I
311121: **Industrial And Technology Management**	311121.1	Differentiate between different types of business organization and discuss the fundamentals of economics and management.
	311121.2	Explain the importance of technology management and quality management.
	311121.3	Describe the characteristics of marketing and its types.
	311121.4	Discuss the qualities of a good leader.
303141: **Advance Microcontroller and its Applications**	303141.1	Explain architecture of PIC18F458 microcontroller, its instructions and the addressing modes.
	303141.2	Develop and debug program in assembly language or C language for specific applications
	303141.3	Use of an IDE for simulating the functionalities of PIC microcontroller and its use for software and hardware development.
	303141.4	Interface a microcontroller to various devices.
	303141.5	Effectively utilize advance features of microcontroller peripherals
303142: **Electrical Machines II**	303142.1	Explain construction & working principle of three phase synchronous machines
	303142.2	Estimate regulation of alternator by direct and indirect methods.
	303142.3	Demonstrate operation of synchronous motor at constant load and variable excitation (v curves & ^ curves) & constant excitation and variable load.
	303142.4	Explain Speed control methods of three phase induction motor.
	303142.5	Plot circle diagram of ac series motor
	303142.6	Obtain equivalent circuit of single phase induction motor by performing no load & blocked rotor test.
303143: **Power Electronics**	303143.1	Develop characteristics of different power electronic switching devices
	303143.2	Reproduce working principle of power electronic converters for different types of loads
	303143.3	Analyse the performance of power electronic converters
303144: **Electrical Installation, Maintenance**	303144.1	Classify distribution systems, its types and substations
	303144.2	Design of different earthing systems for residential and industrial premises
	303144.3	Select methods of condition monitoring and testing of various Electrical Equipments
	303144.4	Estimate and Costing of residential and industrial premises
303145: **Seminar and Technical Communication**	303145.1	Relate with the current technologies and innovations in Electrical engineering.
	303145.2	Improve presentation and documentation skill.
	303145.3	Apply theoretical knowledge to actual industrial applications and research activity.
	303145.4	Communicate effectively.
		TE Semester – II
303146 : **Power System II**	303146.1	Solve problems involving modelling, design and performance evaluation of HVDC and EHVAC power transmission lines.
	303146.2	Evaluate power flow in power transmission networks and apply power flow results to solve simple planning problems.
	303146.3	Calculate currents and voltages in a faulted power system under both symmetrical and asymmetrical faults, and relate fault currents to circuit breaker ratings.
303147 : **Control System-I**	303147.1	Model physical system.
	303147.2	Determine time response of linear system.
	303147.3	Analyse stability of LTI system.
	303147.4	Design PID controller for LTI system.
303148 : **Utilization of Electrical Energy**	303148.1	Get knowledge of principle of electric heating, welding and its applications.
	303148.2	Design simple resistance furnaces and residential illumination schemes.
	303148.3	Calculate tractive effort, power, acceleration and velocity of traction.
	303148.4	Get knowledge of electric braking methods, control of traction motors, train lighting and signaling system.
	303148.5	Understand collection of technical information and delivery of this technical information through presentations.
303149: **Design of Electrical Machines**	303149.1	Calculate main dimensions and Design of single phase and three phase transformer.
	303149.2	Calculate main dimensions of three phase Induction motor.
	303149.3	Determine the parameters of transformer.
	303149.4	Determine parameters of three phase Induction motor.
303150 : **Energy Audit and Management**	303150.1	To get knowledge of BEE Energy policies, Electricity Acts.
	303150.2	Use various energy measurement and audit instruments.
	303150.3	Carry out preliminary energy audit of various sectors
	303150.4	Enlist energy conservation and demand side measures for electrical, thermal and utility Systems.
	303150.5	Solve simple problems on cost benefit analysis.
303151: **Electrical Workshop**	303151.1	Integrate electrical/electronic circuits for useful applications
	303151.2	Acquire hardware skills to fabricate circuits designed.
	303151.3	Read data manuals/data sheets of different items involved in the circuits.
	303151.4	Test and debug circuits.
	303151.5	Produce the results of the testing in the form of report.

BE Semester – I		
403141: **Power System** **Operation and** **Control**	403141.1	To develop ability to analyze and use various methods to improve stability of power systems
	403141.2	To understand the need for generation and control of reactive power.
	403141.3	To impart knowledge about various advanced controllers such as FACTs controllers with its evolution, principle of operation, circuit diagram and applications
	403141.4	To illustrate the automatic frequency and voltage control strategies for single and two area case and analyze the effects, knowing the necessity of generation control.
	403141.5	To understand formulation of unit commitment and economic load dispatch tasks and solve it using optimization techniques
	403141.6	To illustrate various ways of interchange of power between interconnected utilities and define reliability aspects at all stages of power system.
403142: **PLC and** **SCADA** **Applications**	403142.1	To understand the generic architecture and constituent components of a Programmable Logic Controller.
	403142.2	To develop architecture of SCADA explaining each unit in detail.
	403142.3	To develop a software program using modern engineering tools and technique for PLC and SCADA.
	403142.4	To apply knowledge gained about PLCs and SCADA systems to identify few real-life industrial applications.
Elective – I : **403143:** **Special Purpose** **Machines**	403143.1	To gain knowledge of operation and performance of synchronous reluctance motors.
	403143.2	To learn operation and performance of stepping motors.
	403143.3	To understand operation and performance of switched reluctance motors.
	403143.4	To familiarize with operation and performance of permanent magnet brushless D.C. motors.
	403143.5	To illustrate operation and performance of permanent magnet synchronous motors.
Elective – I : **403143:** **Power Quality**	403143.1	To develop ability to identify various power quality issues
	403143.2	To Understand relevant IEEE standards
	403143.3	To illustrate various PQ monitoring techniques and instruments
	403143.4	To learn and characterize various PQ problems
	403143.5	To identify different mitigation techniques
Elective- I : **403143:** **Renewable** **Energy Systems**	403143.1	To develop fundamental understanding about Solar Thermal and Solar Photovoltaic systems.
	403143.2	To provide knowledge about development of Wind Power plant and various operational as well as performance parameter/characteristics.
	403143.3	To explain the contribution of Biomass Energy System in power generation.
	403143.4	To teach different Storage systems, Integration and Economics of Renewable Energy System.
Elective- I : **403143:** **Digital Signal** **Processing**	403143.1	To elaborate Sampling theorem, classification of discrete signals and systems
	403143.2	To analyze DT signals with Z transform, inverse Z transform and DTFT
	403143.3	To describe Frequency response of LTI system
	403143.4	To introduce Digital filters and analyze the response
	403143.5	To demonstrate DSP Applications in electrical engineering
Elective-II: **403144:** **Restructuring** **and Deregulation**	403144.1	To educate students about the process of restructuring of power system
	403144.2	To familiarize students about the operation of restructured power system
	403144.3	To teach students pricing of electricity
	403144.4	To gain knowledge of fundamental concept of congestion management
	403144.5	To analyze the concept of locational marginal pricing and transmission rights.
	403144.6	To provide in-depth understanding of operation of deregulated electricity market systems.
Elective-II: **403144:** **Electromagnetic** **Fields**	403144.1	To impart knowledge on the basics of Static Electric and Static Magnetic Field and the associated laws.
	403144.2	To understand the boundary conditions
	403144.3	To analyze time varying electric and magnetic fields.
	403144.4	To understand Maxwell's equation in different form and media.
	403144.5	To give insight to propagation of EM waves
Elective-II: **403144:** **EHV AC** **Transmission**	403144.1	To understand the need of EHV and UHV systems.
	403144.2	To describe the impact of such voltage levels on the environment.
	403144.3	To know problems encountered with EHV and UHV transmissions.
	403144.4	To know methods of governance on the line conductor design, line height and phase etc.
Elective-II: **403144:** **Introduction to** **Electrical** **Transportation** **Systems**	403144.1	To make students understand the importance and various modes of electric transportation systems such as electric traction, hybrid vehicle and elevators etc.
	403144.2	To differentiate various source of energy used in transportation and their performance characteristics.
	403144.3	To impart knowledge about different power and energy converters.
	403144.4	To classify the different controls used in electric vehicles.
	403144.5	To demonstrate the knowledge about electric cars and elevators.
403145: **Control System -** **II**	403145.1	To learn the concept of compensation and to realize compensator for a system using active and passive elements.
	403145.2	To understand the concept of state and to be able to represent a system in the state space format and to solve the state equation and familiarize with STM and its properties.
	403145.3	To design a control system using state space techniques including state feedback control and full order observer.
	403145.4	To familiarize with various nonlinearities and their behaviour observed in physical system and to understand the Describing function method and phase plane method.

	403145.5	To understand the basic digital control scheme, the concept of sampling and reconstruction. To be able to analyze and design a digital control system including realization of digital controllers.

		BE Semester – II
403147: **Switchgear and** **Protection**	403147.1	To elaborate construction and working principle of different types of HVCBs
	403147.2	To describe the need of protective Relaying and operating principles of different types of relays.
	403147.3	Study different type of faults in transformer, alternator and various protective schemes related to them.
	403147.4	Learn transmission line protection schemes, and characteristics of different types of distance relays.
403148: **Power** **Electronic** **Controlled Drives**	403148.1	To understand the stable steady-state operation and transient dynamics of a motor-load system.
	403148.2	To study and analyze the operation of the converter, chopper fed dc drive.
	403148.3	To study and understand the operation of both classical and modern induction motor drives.
	403148.4	To study and analyze the operation of PMSM and BLDC drives.
	403148.5	To analyze and design the current and speed controllers for different drives.
Elective –III : **403149:** **High Voltage** **Engineering**	403149.1	To make students able to explain the various breakdown processes in solid, liquid and gaseous materials and describe Lightning phenomenon, natural cause of overvoltage in detail with formation of charge in clouds.
	403149.2	To provide sound knowledge of Testing, Generation & measurement methods of DC, AC and impulse voltages and current.
	403149.3	To develop ability to carry out various testing procedures as per IS in laboratory with knowledge of earthing, safety and shielding of HV laboratory.
Elective –III : **403149:** **HVDC and** **FACTS**	403149.1	To provide students knowledge about modern trends in Power Transmission Technology
	403149.2	To make students understand applications of power electronics in the control of power transmission.
	403149.3	To educate students for utilization of software such as PSCAD, MATLAB for power transmission and control.
Elective –III : **403149: Digital** **Control System**	403149.1	To make students understand basic concepts of discrete signals and systems.
	403149.2	To educate students to analyze the stability of discrete systems.
	403149.3	To teach formulation of state space discrete model and design the digital controllers.
	403149.4	To elaborate digitize analog controllers using various numerical methods.
	403149.5	To explore application of the theory of digital control to practical problems.
Elective – III : **403149:** **Intelligent** **Systems and its** **Applications in** **Electrical** **Engineering**	403149.1	To enhance knowledge of intelligence system to carry out power system problems.
	403149.2	To impart knowledge about Artificial neural network and fuzzy logic programming for electrical engineering applications like load dispatch and load shedding.
Elective –IV : **403150 :** **Smart Grid**	403150.1	To understand the concept of Smart Grid, compare with conventional grid, and identify its opportunities and barriers.
	403150.2	To understand the concept of Smart Meter, Smart Appliances, Automatic Meter Reading, Outage Management System, Plug in Hybrid Electric Vehicles, Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.
	403150.3	To understand the concept of Substation Automation, Feeder Automation. Intelligent Electronic Devices, Smart storage like Battery, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System, Phase Measurement Unit.
	403150.4	To understand the concept of microgrid.
	403150.5	To understand the concept of Power Quality and its issues of Grid connected Renewable Energy Sources, Web based Power Quality monitoring, Power Quality Audit.
Elective – IV : **403150:** **Robotics and** **Automation**	403150.1	To know basic parts of a typical industrial robot system with its anatomy with human body.
	403150.2	To analyze mathematically kinematic and dynamic modeling of a typical robot manipulator.
	403150.3	To select an appropriate type of robot with given specifications for different industrial applications.
	403150.4	To know the basics of actuators, sensors and control of an industrial robot for different applications
Elective IV : **403150:** **Illumination** **Engineering**	403150.1	To get the detailed information about modern lamps and their accessories.
	403150.2	To get detailed insight of indoor and outdoor illumination system components, its controls and design aspects.
	403150.3	To know the requirements of energy efficient lighting.
	403150.4	To introduce the modern trends in the lighting.
Elective IV : **403150 :** **VLSI Design**	403150.1	To understand Modeling of Digital Systems Domains for different combinational and sequential circuits.
	403150.2	To understand Levels of Modeling using Modeling Language VHDL.
	403150.3	To Understand Modeling and programming Concepts by Learning a New Language.
	403150.4	To develop of logic design and programming skills in HDL language.
	403150.5	To study HDL based design approach.
	403150.6	To learn digital CMOS logic design.
403146: **Project**	403146.1	To develop skills for carrying literature survey and organize the material in proper manner.
	403146.2	To provide opportunity of designing and building complete system/subsystem based on their knowledge acquired during graduation.
	403146.3	To understand the needs of society and based on it to contribute towards its betterment and to learn to work in a team.
	403146.4	To explore and to acquire specified skill in areas related to Electrical Engineering.
	403146.5	To ensure the completion of given project such as fabrication, conducting experimentation, analysis, validation with optimized cost.

	403146.6	Collect the data in report form and represent and communicate findings of the completed work in written and verbal form.