Sri SAIRAM COLLEGE OF ENGINEERING
Anekal, Bengaluru

ISO 9001:2015 certified Institution
Approved by AICTE, New Delhi
Affiliated to Visvesvaraya Technological University
www.sairamce.edu.in

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

Course Code	Course Name	CO Code	CO
15MAT31	ENGINEERING MATHEMATICS - 3	CO1	Know the use of periodic signals and Fourier series to analyze circuits and system communication.
		CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transforms and Z-transform.
		CO3	Employ appropriate Numerical methods to solve algebraic and transcendental equations.
		CO4	Apply Greens theorem, Divergence theorem and Stokes theorem in various applications in the field of elector-magnetic and gravitational fields and fluid flow problems.
		CO5	Determine the externals of functionals and solve the simple problems of the calculus of variations.
15EE32	ELECTRIC CIRCUIT ANALYSIS	CO1	Understanding the basics concepts, basic laws and methods of analysis of DC and AC network. Reduce the complexity of network using source shifting, source transformation and network reduction using transformation
		CO2	Solve complex electric circuits using network theorems.
		CO3	Discuss resonance in series and parallel circuits. Discuss the importance of initial conditions and their evaluation
		CO4	Synthesize typical waveforms using Laplace transformation.
		CO5	Solve unbalanced three phase systems. Evaluate the performance of two port network
15EE33	TRANSFORMERS AND GENERATORS	CO1	Analyze the characteristics and operation of the synchronous generators connected to infinite busbar
		CO2	Explain the use of polarity and sumpner's tests conducted, auto transformer, tap changing transformer and need of operating

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

			transformers in parallel.
		CO3	Explain the use of tertiary winding transformer, armature reaction, commutation, their effects in DC generators, construction, armature reaction and operation of the synchronous generators
		CO4	Explain the construction, operation, performance of single phase and three phase transformers and different connections for the three phase operations, their advantages and applications
		CO5	Explain the performance of Synchronous generators and evaluate the voltage regulation by different methods.
15EE34	15EE34-Analog Electronic Circuits	CO1	Utilize the characteristics of transistor for different applications.
		CO2	Analyze the Transistor Response at High & Low Frequency.
		CO3	Design, analyze and test Feed Back Amplifiers.
		CO4	Design, analyze and test transistor circuitry as amplifiers and oscillators.
		CO5	Distinguish Different types of MOSFETs.
15EE35	DIGITAL SYSTEM DESIGN	CO1	Simplify switching equations generated from truth tables.
		CO2	Design combinational logic circuits; adders, Subtractors and comparators.
		CO3	Design synchronous sequential circuits; latches, flip-flops, binary counters and Mod – 6 counters.
		CO4	Design and constructs state diagram of Mealy and Moore synchronous sequential circuit models
		CO5	Describe the structure of HDL module, Comparison between VHDL and Verilog, and concept of data-flow description
15EE36	ELECTRICAL & ELECTRONIC MEASUREMENTS	CO1	Understand the characteristics of • Measure resistance, inductance and capacitance using bridges and determine earth resistance
		CO2	Write down in details with application, if applicable, Explain the working of various

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			meters used for measurement of Power & Energy
		CO3	Understand the details of Understand the adjustments, calibration & errors in energy meters
		CO4	Learn in details with examples methods of extending the range of instruments & instrument transformers
		CO5	Deliberate the characteristics of Explain the working of different electronic instruments, display devices and recording mechanisms
15EEL37	ELECTRICAL MACHINES LAB - 1	CO1	Evaluate the performance of transformers from the test data obtained
		CO2	Connect and operate two single phase transformers of different KVA rating in parallel.
		CO3	Connect single phase transformers for three phase operation and phase conversion.
		CO4	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory
		CO5	Evaluate the performance of synchronous generators from the test data and Assess the performance of synchronous generator connected to infinite bus.
15EEL38	Electronics Laboratory	CO1	Design and test different diode circuits
		CO2	Design and test amplifier and oscillator circuits and analyse their performance.
		CO3	Use universal gates and ICs for code conversion and arithmetic operations.
		CO4	Design and verify on of different counters.
		CO5	Design and test different diode circuits
15MAT41	ENGINEERING MATHEMATICS - 4	CO1	Use appropriate single step and multi-step numerical methods to solve first and second order ordinary differential equations arising in flow data design problems.
		CO2	Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
		CO3	Employ Bessel's functions and Legendre's

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

			polynomials for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction.
		CO4	Describe random variables and probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, information, coding theory and stability analysis of systems.
		CO5	Apply the knowledge of joint probability distributions and Markov chains in attempting engineering problems for feasible random events
15EE42	Power Generation and Economics (Core)	CO1	Describe the working of hydroelectric power plant and state functions of major equipment of the power plants.
		CO2	Describe the working of steam, diesel and gas turbine power plants and state functions of major equipment of the power plants.
		CO3	Describe the working of nuclear power plants and state functions of major equipment of the power plants.
		CO4	Classify various substations and explain the importance of grounding.
		CO5	Understand the economic aspects of power system operation and its effects.
15EE43	Transmission and Distribution (Core)	CO1	Explain the concepts of various methods of generation of power and understand the importance of HVAC, EHVAC, UHVAC and HVDC transmission
		CO2	Calculate the parameters of the transmission line for different configurations and assess the performance of line Design and analyze overhead transmission system for a given voltage level.
		CO3	Explain the classification of lines, understand corona and methods to reduce it,the use of underground cables, construction ,specifications.
		CO4	Discuss different distribution systems and analyze with different types of loads.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

		CO5	Evaluate different types of distribution systems, reliability, probability and the limitations of distribution systems.
15EE44	ELECTRIC MOTORS	CO1	Explain the constructional features of Motors and select a suitable drive for specific application
		CO2	Analyze and assess the performance characteristics of DC motors by conducting suitable tests and control the speed by suitable method
		CO3	Explain the constructional features of Three Phase and Single phase induction Motors and assess their performance
		CO4	Control the speed of induction motor by a suitable method
		CO5	Explain the operation of Synchronous motor and special motors
15EE45	ELECTROMAGNETIC FIELD THEORY	CO1	Explain the fundamental concepts of vector analysis and the behavior of static electric fields in vacuum of free space
		CO2	Compute energy and potential due to a system of charges, explain the behavior of field across a boundary between two different media
		CO3	Solve Poison's and Laplace equation in different coordinate systems, Evaluate magnetic field quantities for different current distributions
		CO4	Determine forces and torques exerted by magnetic fields on other charges, Study of magnetic materials, inductance
		CO5	Understand the concepts of time varying field produced by changing electric and magnetic fields, Application of Maxwell's equations to study fundamental theory of wave motion
15EE46	Operational Amplifiers and Linear Ics (Foundation course)	CO1	Describe the characteristics of ideal and practical operational amplifier and design the applications of op-amp circuit.
		CO2	Design filters using linear ICs and op-amp regulators circuits using specifications
		CO3	Design signal generators and comparator

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			&converter circuits using linear ICs
		CO4	Design ADC and DAC using op-amps; demonstrate the application of Linear ICs as comparators and rectifiers
		CO5	Design and describe the application of PLL using IC 565 &applications of multivibrators using IC 555.
15EEL47	Electrical Machines Laboratory -2	CO1	Test dc machines to determine their characteristics
		CO2	Control the speed of dc motor by armature and field control.
		CO3	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
		CO4	Perform load test on single phase induction motor, three phase induction motor and induction generator to assess its performance.
		CO5	Conduct test on induction motor to pre-determine the performance characteristics and synchronous motor to draw the performance curves.
15EEL48	Op- amp and Linear ICs Laboratory	CO 1	To conduct experiment to determine the characteristic parameters of OP-Amp
		CO 2	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator
		CO 3	To design test the OP-Amp as Amplifier as voltage comparator and zero crossing detector
		CO 4	To design test the OP-Amp as oscillators and filters
		CO 5	Design and study of Linear IC's as multivibrator power supplies.
15EE51	Management and Entrepreneurship	CO1	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process.
		CO2	Discuss work allocation, the structure of organization, the modes of communication and importance of managerial control in business

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

		CO3	To explain need of coordination between the manager and staff in exercising the authority and delegating duties.
		CO4	To explain the social responsibility of business and leadership, concepts of entrepreneurship and the role and importance of the entrepreneur in economic development
		CO5	To understand the role and importance of SSI, business plan and presentation and Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing, state /central level institutions / agencies supporting business enterprises
15EE52	Microcontroller	CO1	Discuss the history of the 8051 and features of other 8051 family members and the internal architecture of the 8051, 8051 addressing modes and memory interfacing
		CO2	Explains the use of an 8051 assembler, the stack and the flag register, loop, jump, and call instructions , accessing data and I/O port programming, arithmetic, logic instructions, and write simple programs.
		CO3	Develop 8051C programs for time delay generation , and using timers for delay generation and as counters
		CO4	Discuss the serial data communication and its interfacing of 8051to the RS232, 8051 interrupts and writing interrupt handler programs.
		CO5	Interface 8051 with real-world devices such as LCDs and keyboards, ADC, DAC chips and sensors, relays, opt isolators and motors.
15EE53	15EE53-Power Electronics	CO1	Deliberate the classification and characteristics of Explain application area of power electronics, types of power electronic circuits and switches their characteristics and specifications. • Explain types of power diodes, their characteristics, and the effects of power diodes on RL circuits

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

		CO2	Specify in details with application, if applicable, Explain the techniques for design, operation and analysis of single phase diode rectifier circuits. • Explain steady state, switching characteristics and gate control requirements of different power transistors and their limitations.
		CO3	Specify the classification and characteristics of Discuss different types of Thyristors, their operation, gate characteristics and gate control requirements.
		CO4	Write down the classification and characteristics of Explain designing, analysis techniques and characteristics of thyristor controlled rectifiers.
		CO5	Write down in details with application, if applicable, Discuss the principle of operation of single phase and three phase DC - DC, DC – AC converters and AC voltage controllers.
15EE54	SIGNALS & SYSTEMS	CO1	Classify the signals and systems and Explain basic operations on signals and properties of systems.
		CO2	Using convolution analyzes the impulse response of systems for both continuous & discrete time domain; also provide block diagram representation of LTI systems.
		CO3	Apply CTFT representation to study signals and to evaluate the frequency response of LTI systems, solution of differential equation
		CO4	Apply DTFT representation to study signals and evaluate the frequency response of LTI systems solution of difference equation.
		CO5	Use Z-transform and properties of Z transform for the analysis of discrete time systems
15EE553	Electrical Estimation & Costing	CO1	Explain the purpose of estimation and costing,Discuss market survey, estimates, purchase enquiries, preparation of tenders, comparative statements and payment of bills, Discuss Indian Electricity act and Indian Electricity rules

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

		CO2	Discuss distribution of energy in a building, wiring and methods of wiring, cables used in internal wiring, wiring accessories and fittings, fuses and types of fuses.Discuss design of lighting points and its number, total load, sub-circuits, size of conductor
		CO3	Discuss types of service mainsand estimation of service mains and power circuits.
		CO4	Discuss estimation of overhead transmission and distribution system and its components.
		CO5	Discuss main components of a substation, preparation of single line diagram of a substation and earthing of a substation
15EE562	Programmable Logic COntrollers	CO1	Understand and discuss history of PLC, its sequence of operation, advantages and disadvantages, main parts and their functions and describe the hardware components of PLC: I/O modules, CPU, memory devices, other support devices, operating modes and PLC programming.
		CO2	Describe field devices used commonly used with I/O module and able to convert the relay schematics into PLC ladder diagram and analyze PLC Timer with its ladder logic
		CO3	Analyze PLC counters ladder logic programs and describe the operation of different program control instructions
		CO4	Discuss the execution of data transfer instructions, data compare instructions and the basic operation of PLC closed-loop control system.
		CO5	Describe the operation of mechanical sequencers, bit and word shift registers, processes and structure of control systems and communication between the processes.
15EEL57	MICROCONTROLLER LABORATORY	CO1	Write assembly language programs for data transfer, arithmetic, Boolean and logical instructions.
		CO2	Write ALP for code conversions.
		CO3	Write ALP using subroutines for generation of delays, counters, configuration of SFRs for

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			serial communication and timers.
		CO4	Perform interfacing of stepper motor and dc motor for controlling the speed.
		CO5	Generate different waveforms using DAC interface. Work with a small team to carryout experiments using microcontroller concepts and prepare reports that present lab work.
15EEL58	POWER ELECTRONICS LAB	CO1	Understand in depth Obtain static characteristics of semiconductor devices to discuss their performance. Trigger the SCR by different methods.
		CO2	Identify the details of Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads.
		CO3	Understand in details with examples Control the speed of a dc motor, universal motor and stepper motors
		CO4	Write down in depth Verify the performance of single phase full bridge inverter connected to resistive load
		CO5	Deliberate the details of Perform commutation of SCR by different methods.
15EE61	15EE61-CONTROL SYSTEMS	CO1	Discuss the effects of feedback and types of feedback control systems and demonstrate the knowledge of mathematical modelling of control system.
		CO2	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems.
		CO3	Evaluate the transfer function of a linear time invariant systems, Evaluate the stability of linear time invariant system and determine transient and steady state response of a simple control system.
		CO4	Investigate the performance of a given system in time and frequency domains and discuss the stability analysis using root locus and bode plots.
		CO5	: Discuss the stability analysis using Nyquist plots and determine the controller or compensator configuration and parameter

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

			values relative to how it is connected to the controlled process given the design specification.
15EE62	15EE62-POWER SYSTEM ANALYSIS - 1	CO1	Show understanding of per unit system, its advantages and computation, the concept of one line diagram and its implementation in problems
		CO2	Perform short circuit analysis on a synchronous machine and simple power system to select a circuit breaker for the system.
		CO3	Evaluate symmetrical components of voltages and currents in un-balanced three phase circuits and explain the concept of sequence impedance and sequence networks of power system components and power system.
		CO4	Analyze three phase synchronous machine and simple power systems for different unsymmetrical faults using symmetrical components.
		CO5	Discuss the dynamics of synchronous machine, stability, types of stability and equal area criterion for the evaluation of stability of a simple system under different fault conditions.
15EE63	15EE63-DIGITAL SIGNAL PROCESSING	CO1	Compute the DFT of various signals using its properties and linear filtering of two sequences.
		CO2	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence.
		CO3	Design infinite impulse response Butterworth digital filters using impulse invariant / bilinear transformation technique. Design infinite impulse response Chebyshev digital filters using Impulse invariant.
		CO4	Design infinite impulse response Chebyshev digital filters using bilinear transformation technique. Realize a digital IIR filter by direct, cascade, parallel and ladder methods of realization.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

		CO5	Discuss different window functions and frequency sampling method used for design of FIR filters. Design FIR filters by use of window function or by frequency sampling method. Realize a digital FIR filter by direct, cascade, and linear phase form.
15EE64	15EE64-ELECTRICAL MACHINE DESIGN	CO 1	Discuss design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines. Discuss selection of specific loadings and magnetic circuits of different electrical machines
		CO 2	Derive the output equations, DC machines , Design the field windings of DC machine, Design stator and rotor circuits of a DC
		CO 3	Design the field windings of Synchronous machine, Discuss short circuit ratio and its effects on performance of synchronous machines.
		CO 4	Derive the output equations of transformer, Estimate the number of cooling tubes, no load current and leakage reactance of core type transformer
		CO 5	Design stator and rotor circuits of a AC machines ,Design salient pole and non-salient pole alternators for given specifications
15EE651	15EE651-COMPUTER AIDED ELECTRICAL DRAWING	CO 1	Discuss the terminology and types of DC and AC armature windings , Develop armature winding diagram for DC and AC machines
		CO 2	Develop a layout for substation using the standard symbols for substation equipment.
		CO3	Draw sectional views of core and shell types transformers using the design data
		CO 4	Draw sectional views of assembled DC machine or its parts using the design data or the sketches.
		CO 5	Draw sectional views of assembled alternator or its parts using the design data or the sketches
15EE662	15EE662-SENSORS & TRANSDUCERS	CO1	Discuss need of transducers, classification of transducer, understanding of working of

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			various transducers and sensors, advantages and disadvantages.
		CO2	Discuss recent trends in sensor technology and their selection
		CO3	Discuss basics of signal conditioning and signal conditioning equipment, configuration of Data Acquisition System and data conversion
		CO4	Discuss and Describe knowledge of data transmission and telemetry
		CO5	Explain measurement of non-electrical quantities -temperature, flow, speed, force, torque, power and viscosity
15EEL67	15EEL67-CONTROL SYSTEM LAB	CO1	1. Use software package or discrete components in assessing the time and frequency domain reposes of a given second order system.
		CO2	Design and analyze Lead, Lag and Lag – Lead compensators for given specifications.
		CO3	Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems.
		CO4	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system.
		CO5	Write a script files to plot root locus, bode plot, Nyquist plots to study the stability of the system using a software package.
15EEL68	15EEL68-DIGITAL SIGNAL PROCESSING LAB	CO1	Specify in details with application, if applicable, Give physical interpretation of sampling theorem in time and frequency domains. Evaluate the impulse response of a system
		CO2	Understand the characteristics of Perform convolution of given sequences to evaluate the response of a system
		CO3	Write down the classification and characteristics of Compute DFT and IDFT of a given sequence using the basic definition

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			and/or fast methods.
		CO4	Understand the classification and characteristics of Provide a solution for a given difference equation. Design and implement IIR and FIR filters
		CO5	Deliberate in details with application, if applicable, Conduct experiments using software and prepare reports that present lab work
15EE71	POWER SYSTEM ANALYSIS - 2	CO1	Formulate network matrices and models for solving load flow problems
		CO2	Perform steady state power flow analysis of power system using numerical iterative techniques. suggest a method to control voltage profile
		CO3	Show knowledge of optimal operation of generators on a bus bar optimal commitment
		CO4	Discuss optimal scheduling for hydro thermal system power system security and stability
		CO5	Analyse short circuit fault in power system networks using bus impedance matrix. Performance numerical solution of swing equation for multi machine stability
15EE72	POWER SYSTEM PROTECTION	CO1	Discuss performance of protective relays, components of protection scheme and relay terminology overcurrent protection. Explain the working of distance relays and the effects ofarc resistance, power swings, line length and source impedance on performance of distance relays
		CO2	Discuss pilot protection; wire pilot relaying and carrier pilot relaying.Discuss construction, operating principles and performance of differential relays for differential protection
		CO3	Discuss protection of generators, motors, Transformer and Bus Zone Protection
		CO4	Explain the principle of circuit interruption in different types of circuit breakers
		CO5	Describe the construction and operating principle of different types of fuses and to give

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			the definitions of different terminologies related to a fuse. Discuss protection against Overvoltages and Gas Insulated Substation (GIS)
15EE73	HIGH VOLTAGE ENGINEERING	C01	Explain conduction and breakdown phenomenon in gases, liquid dielectrics.
		CO2	Explain breakdown phenomenon in solid dielectrics.
		CO3	Explain generation of high voltages and currents
		CO4	Discuss measurement techniques for high voltages and currents.
		CO5	Discuss overvoltage phenomenon and insulation coordination in electric power systems. Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus
15EE742	UTILIZATION OF ELECTRICAL POWER	CO1	Discuss electric heating, air-conditioning, electric welding and Explain laws of electrolysis, extraction and refining of metals and electro deposition.
		CO2	Explain the terminology of illumination, laws of illumination, construction and working of electric lamps and Design interior and exterior lighting systems, illumination levels for factory lighting, flood lighting, street lighting.
		CO3	Discuss systems of electric traction, speed - time curves and mechanics of train movement and Explain the motors used for electric traction and their control.
		CO4	Discuss braking of electric motors, traction systems and power supply and other traction systems.
		CO5	Explain the working of electric and hybrid electric vehicles.
15EE751	FACTs and HVDC TRANSMISSION	CO1	Discuss transmission interconnections, flow of Power in an AC System, limits of the loading capability, dynamic stability considerations of a transmission interconnection and controllable parameters, basic concepts of

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			FACTS technology
		CO2	Describe shunt controllers, Static Var Compensator and Static Compensator for injecting reactive power in the transmission system in enhancing the controllability and power transfer capability.
		CO3	Describe series Controllers Thyristor-Controlled Series Capacitor (TCSC) and the Static Synchronous Series Compensator (SSSC) for control of the transmission line current.
		CO4	Explain advantages of HVDC power transmission, overview and organization of HVDC system, and power conversion of3-Phase Converter, 3-Phase Full Bridge Converter, 12-Pulse Converter
		CO5	Describe the basic components of a converter, the methods for compensating the reactive power demanded by the converter, Explain converter control for HVDC systems, commutation failure, control functions
15EEL76	15EEL76-POWER SYSTEM SIMULATION LAB	CO1	Develop a program in MATLAB assess the performance of medium and long transmission lines.
		CO2	Develop a program in MATLAB to obtain the power angle characteristics of salient and non salient pole.
		CO3	Develop a program in MATLAB to assess the transient stability under thre phase fault at different locations in a of radial power system. Develop program in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power system.
		CO4	Use Mi- Power package to solve power flow problem for simple power system.
		C05	Use Mi-Power package to study unsymmetrical faults at different loctions in radial power system. Use of Mi- Power package to study optimal generation scheduling problems for thermal power plants.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

15EEL77	15EEL77RELAY & HIGH VOLTAGE LAB	CO1	Experimentally verify the characteristics of over current, over voltage, under voltage and negative sequence relays both electromagnetic and static type
		CO2	Experimentally verify the characteristics of microprocessor based over current, over voltage, under voltage relays and distance relay.
		CO3	Show knowledge of protecting generator, motor and feeders. Analyze the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages.
		CO4	Measure high AC and DC voltages and breakdown strength of transformer oil., Draw electric field and measure the capacitance of different electrode configuration models
		CO5	Show knowledge of generating standard lightning impulse voltage to determine efficiency, energy of impulse generator and 50% probability flashover voltage for air insulation
15EEP78	15EEP78-PROJECT PHASE - 1 + SEMINAR	CO1	Demonstrate a sound technical knowledge of their selected project topic
		CO2	Undertake problem identification, formulation and solution
		CO3	Design engineering solutions to complex problems utilising a systems approach.
		CO4	Communicate with engineers and the community at large in written an oral forms.
		CO5	Demonstrate the knowledge, skills and attitudes of a professional engineer
15EE81	15EE81-Power System Operation and Control	CO1	Describe various levels of controls in power systems, Analyze the vulnerability of the system, components, architecture, configuration of SCADA and solving the unit commitment problems
		CO2	Explain basic generator control loops, functions of Automatic generation control, speed governors and Analyze issues of hydrothermal scheduling & solutions to hydro

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

			thermal problems
		CO3	Develop the mathematical model of Automatic Load Frequency Control, Controllers in Automatic Generation Control, Tie-Line Bias Control and State Space Models of Automatic Generation Control in an interconnected power system
		CO4	Apply Automatic Generation Control, Voltage Control and Reactive Power Control in an interconnected power system.
		CO5	Understand and Analyze reliability, security, contingency analysis, state estimation and Apply to power systems.
15EE82	15EE82-Industrial Drives and Applications	CO1	Explain the advantages and choice of electric drive
		CO2	Explain dynamics and different modes of operation of electric drives.
		CO3	Suggest a motor for a drive and control of dc motor using controlled rectifiers.
		CO4	Analyze the performance of induction motor drives under different conditions
		CO5	Control induction motor, synchronous motor and stepper motor drives. Suggest a suitable electrical drive for specific application in the industry
15EE831	15EE831-Smart Grid	CO1	Deliberate in depth Discuss the progress made by different stakeholders in the design and development of smart grid. Explain measurement techniques using Phasor Measurement Units and smart meters.
		CO2	Understand the characteristics of Discuss tools for the analysis of smart grid and design, operation and performance
		CO3	Deliberate in details with examples Discuss classical optimization techniques and computational methods for smart grid design, planning and operation. Explain predictive grid management and control technology for enhancing the smart grid performance
		CO4	Specify in details with examples Develop cleaner, more environmentally responsible

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
2015 SCHEME CO's

			technologies for the electric system. Discuss the computational techniques, communication, measurement, and monitoring technology tools essential to the design of the smart grid.
		CO5	Understand the characteristics of Explain methods to promote smart grid awareness and making the existing transmission system smarter by investing in new technology
15EE84	15EE84-Internship / Professional Practice	CO1	Gain practical experience within industry in which the internship is done. Acquire knowledge of the industry in which the internship is done.
		CO2	Apply knowledge and skills learned to classroom work. Develop a greater understanding about career options while more clearly defining personal career goals.
		CO3	Experience the activities and functions of professionals. Develop and refine oral and written communication skills.
		CO4	Identify areas for future knowledge and skill development. Expand intellectual capacity, credibility, judgment, intuition.
		CO5	Acquire the knowledge of administration, marketing, finance and economics.
15EEP85	15EEP85-Project Work Phase -II	CO 1	Present the project and be able to defend it. Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
		CO 2	Habituated to critical thinking and use problem solving skills
		CO 3	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms
		CO 4	Work in a team to achieve common goal
		CO 5	Learn on their own, reflect on their learning and take appropriate actions to improve it.
15EES86	15EES86-Seminar	CO 1	Attain, use and develop knowledge in the field of electrical and electronics engineering and other disciplines through independent

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2015 SCHEME CO's

			learning and collaborative study.
		CO 2	Identify, understand and discuss current, real-time issues
		CO 3	Improve oral and written communication skills
		CO 4	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
		CO 5	Apply principles of ethics and respect in interaction with others.