Department of Electrical and Electronics Engineering

All Subjects Course Outcomes (COs)

R20 Regulations

COURSE TITLE	COURSE CODE	CO NO	COURSE OUTCOMES
ALGEBRA AND CALCULUS	20MA1001	**CO 1**	Solve the system of Linear Equations
		CO 2	Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, orBernoulli cases
		CO 3	Obtain the complete solution of a higher order differentialequations
		CO 4	Make use of the Taylor's and Maclaurin's Series and Maxima, Minima for the given function
		CO 5	Apply a range of techniques for solutions of first order Linearand non linear Partial Differential Equations (PDE)
		CO6	Apply the techniques of Multiple integrals for the Area ofthe region bounded by curves and volume.
APPLIED PHYSICS	20PH1001	**CO 1**	Explain optical phenomenon i.e. interference, diffraction using Huygen's wavetheory.
		CO 2	Comprehend and explain the concepts of matter waves, wave functions and its interpretation to understand the matter at atomic scale.
		CO 3	Comprehend Free electron theories on metals and apply them to learn the dynamics of free electrons in metals
		CO 4	Computercarrier concentration in semiconductors and to understand carrier transport mechanism in semiconductors
		CO 5	Understand the concepts of superconductors and nano materials to familiarize their applications in relevant fields.
		CO 6	Realize importance of LASERs in Engineering and Medical applications.
PROBLEM SOLVING AND PROGRAMMING	20ES1001	**CO 1**	Identify methods to solve a problem through computer programming.
		CO 2	Understand the use of basic elements of C language
		CO 3	Understand the difference and the usage of various control statement
		CO 4	Apply the modular approach for solving the problems
		CO 5	Apply the Arrays and Pointers for solving problems
		CO 6	Explain User-Defined Data Types and Files

ENGLISH	20EN1001	**CO 1**	Acquire in depth knowledge on formulating appropriate sentences withgrammatical accuracy and vocabulary building
		CO 2	Understand the factors that influence in use of grammar and learn to usesentences unambiguously
		CO 3	Impart effective strategies for professional written communication using devices ofcoherence & cohesion with adequate support & detail
		CO 4	Provide knowledge of use of phrases & clauses and improve effective writingNote making & Paraphrasing
		CO 5	Understanding the grammar rules for synthesis of sentences and use prewriting strategies to plan to write dialogues, reviews and edit the text effectively
		CO 6	Master the skills and sub skills of reading and use strategies for reading effectively andprovide knowledge on the structure and format of technical writing
Applied Physics lab	20PH1501	**CO 1**	learn important concepts of physics through involvement in the experiments by applying theoretical knowledge
		CO 2	understand the concepts of interference and diffraction and their applications
		CO 3	recognize the applications of laser in finding the wavelength, slit width and itsrole in diffraction studies
		CO 4	understand the important parameters of optical fibres and metals
ELECTRICAL ENGINEERING WORKSHOP	20ES1501	**CO 1**	Demonstrate knowledge on different tools, abbreviations and symbols used inElectrical Engineering
		CO 2	Measure different electrical quantities using measuring instruments
		CO 3	Explain how to trouble shoot the electrical equipments (like fan, grinder, motor,etc.)
		CO 4	Understand about wiring and earthing for residential houses
ENGINEERING & ITWORK SHOP PART – A ENGINEERING WORK SHOP	20ES1505	**CO 1**	Understand the safety aspects in using the tools and equipments
		CO 2	Apply tools for making models in respective trades of engineering workshop
		CO 3	Applybasicelectricalengineeringknowledgetomakesimplehousewiringcircuits andchecktheirfunctionality
		CO 4	Understand to disassemble and assemble a Personal Computer and preparethe computer ready to use
		CO 5	Apply knowledge to Interconnect two or more computers for informationsharing
PART-B	20ES1505	**CO 1**	Understand functionalities of a computer and operating

IT WORKSHOP LAB			system
		CO 2	Practice Word processors, Presentation and Spreadsheet tool
		CO 3	Connect computer using wired and wireless connections.
Problem Solving and Programming Lab	20ES1506	**CO 1**	Translate algorithms into programs (In C language)
		CO 2	Code and debug programs in C program language using various constructs
		CO 3	Solve the problems and implement algorithms in C.
		CO 4	Make use of different data types to handle the real time data
ENGLISH LANGUAGE LAB	20EN1501	**CO 1**	Understand how speech sounds are used to create meaning. Apply their knowledgeof English phonetics and phonology to improve their own pronunciation
		CO 2	Recognize and use pitch patterns to signal complete and incomplete thoughtgroups and Speak confidently and intelligibly within groups and before an audience
		CO 3	Discuss and respond to content of a lecture or listening passage orally and/or inwriting and make inferences and predictions about spoken discourse
		CO 4	Produce coherent and unified paragraphs with adequate support and detail and canwrite a paragraph with a topic sentence, support, and concluding sentence
		CO 5	To help the students to cultivate the habit of reading passages for competitiveexams such as GRE, TOEFL, GMAT etc
		CO 6	Learn, practice and acquire the skills necessary to deliver effective, presentationwith clarity and enable them to prepare resume with cover letter.
VECTOR CALCULUS, COMPLEX VARIABLES & TRANSFORMS (VC-CV&TS)	20MA1003	**CO 1**	Utilize different operators such as gradient, curl and divergence find the function
		CO 2	Evaluate area and volumes by fundamental theorems of vector integration
		CO 3	Apply the complex functions, Cauchy's integral Theorem to find the integralvalues
		CO 4	Solve the differential equation by using Laplace transforms and its techniques
		CO 5	Apply the Inverse Laplace transforms techniques to covert into time Domaine
		CO6	Find the Fourier Series and Fourier Transform for the given functions
CHEMISTRY (COMMON TO	20CH1001	**CO 1**	Understand the fundamental concepts of chemistry to predict the structure andbonding of materials

ECE,EEE&CSE)		**CO 2**	Infer the knowledge about various kinds of electro chemical cells
		CO 3	Describe various energy storage devices and emerging technologies
		CO 4	Understand the mechanism and applications of different polymers in electronic devices
		CO 5	Familiarize the various sources of renewable energy and their harneshing
		CO 6	Apply the electromagnetic radiation to the spectroscopymethods for the analysis of engineering
BASIC ELECTRICAL CIRCUITS	20ES1002	**CO 1**	Apply the basics of circuit analysis
		CO 2	Analyze the behaviour of magnetic circuit
		CO 3	Explain the fundamentals of AC circuits
		CO 4	Analyze AC circuits along with resonance and locus diagrams
		CO 5	Analyze an electric network using graph theory and different network
		CO 6	Analyze the electrical circuits using various network theorems
Introduction to Python Programming	20ES1007	**CO 1**	Summarize the fundamental concepts of python programming
		CO 2	Apply the basic elements and constructs the python to solve logical problems
		CO 3	Organize data using different data structures of python
		CO 4	Implement the files modules and packages in programming
		CO 5	Apply object oriented &exception handling concepts to build simple applications
		CO 6	Implement the concepts ofTurtle Graphics.
CHEMISTRY LAB (COMMON TO ECE,EEE&CSE)	20CH1501	**CO 1**	Determine the cell constant and conductance of solutions
		CO 2	Perform quantitative analysis using instrumental methods
		CO 3	utilize the fundamental laboratory techniques for analyses such as titrations,separation/purification\ and Spectroscopy
		CO 4	analyze and gain experimental skill
BASIC ELECTRICAL CIRCUIT LAB	20ES1507	**CO 1**	Apply Practical implications of the fundamentals of Kirchhoff's current and voltage Laws
		CO 2	Familiar with basic electrical measurement instruments and know how to usethem to make different types of

			measurements
		CO 3	Practically determine band width, Q-factor and verify with theoretical values
		CO 4	Apply suitable theorems for circuit analysis and verify the results theoretically
ENGINEERING GRAPHICS LAB	20ES1504	**CO 1**	Define the qualities of precision and accuracy in engineering drawing
		CO 2	Draw engineering curves with different methods
		CO 3	Develop the orthographic projection of points and straight lines
		CO 4	Construct the planes and simple solids
		CO 5	Understand and practice basic AUTOCAD commands
		CO6	Construct Isometric views using AUTOCAD
Introduction to Python Programming LAB	20ES1510	**CO 1**	Understanding and use of python- Basic Concepts
		CO 2	Solve the concepts of python functions and data structures
		CO 3	Understand the concepts of files, modules, multithreading and regular expressions
		CO 4	Solve the concepts of class and exception handling
ORAL COMMUNICATION SKILLS LAB	20EN1502	**CO 1**	To develop knowledge, skills, and judgment around human communication that facilitatestheir ability to work collaboratively with others
		CO 2	Use listening skills to create more effective, less confrontational, more productive professional & personal relationships and understand techniques required for excellent telephone etiquette
		CO 3	Develop their public speaking abilities to speak both formally and informally
		CO 4	Learn the skills necessary to deliver effective presentation with clarity and impact
		CO 5	Understand the nuances of English language and skills required for effective participationin group activities
		CO 6	Learn to face different types of interviews with confidence and understand the procedure & preparation required for attending an interview.
PROBABILITY, STATISTICS AND NUMERICAL METHODS	20MA1006	**CO 1**	Use the concept of discrete and continuous probability distributions in life testing, expected failures for various engineering applications
		CO 2	Test the Large samples data by applying inferential techniques
		CO 3	Test the small samples data by applying inferential techniques
		CO 4	Apply the knowledge how to solve algebraic and

			transcendental equations using numerical methods and interpolating the polynomials
		CO 5	Utilize the numerical differentiation and integration techniques to solve engineering problems
		CO 6	Solve initial value problems of ordinary differential equations by using numerical techniques
DATA STRUCTURES	20ES1011	**CO 1**	Understand basic concepts of data structures and algorithm analysis
		CO 2	Develop the applications using stacks and queues
		CO 3	Demonstrate the use of linked lists
		CO 4	Apply tree, graph data structures for various applications
		CO 5	Implement algorithms for sorting, searching, and hashing methods
ELECTRONIC DEVICES AND CIRCUITS	20ES1013	**CO 1**	Illustrate the V-I characteristics of P-N junction Diode and special semiconductor devices
		CO 2	Demonstrate the performance of rectifiers with and without filters Demonstrate the performance of rectifiers with and without filters
		CO 3	Compare the operating characteristics of BJT
		CO 4	Analyze the BJT biasing techniques.
		CO 5	Interpret the characteristics of MOSFET.
Electrical Circuit Analysis	20EE2001	**CO 1**	Understand the analysis of three phase balanced and unbalanced circuits
		CO 2	Solve the problems in DC transient response for the given circuit
		CO 3	Solve the problems in AC transient response for the given circuit
		CO 4	Analyze the given network using different two port network parameters
		CO 5	Explain about the fundamental and types of filters
DC MACHINES AND TRANSFORMERS	20EE2002	**CO 1**	Study construction, different phenomena like: armature reaction, commutation inDC machines.
		CO 2	Understand about different types of dc generators and significance of OCC.
		CO 3	Develop mathematical relations for torque developed by dc motor and learn aboutspeed – torque characteristics of different types of DC motor. Gain knowledge ofabout different testing methods of dc machines.
		CO 4	Identification of physical components of single phase transformer.
		CO 5	Learn difference between two windings and auto transformers. Identification of three phase transformers circuits.

DC MACHINES AND TRANSFORMERS Lab	20EE2501	**CO 1**	Determine the magnetization and load characteristics of a DC shunt generator
		CO 2	Describe the efficiency and performance characteristics of DC motors
		CO 3	Predetermination of transformer with different loads
Electrical Circuits And Simulation Lab	20EE2502	**CO 1**	To design electrical systems
		CO 2	To analyze a given network by applying various Network Theorems
		CO 3	To measure three phase Active and Reactive powe
		CO 4	To understand the locus diagrams
ANALOG ELECTRONIC CIRCUITS	20EE2003	**CO 1**	Demonstrate the concept of linear and non linear wave shaping circuits.
		CO 2	Illustrate the concept of different types of feedback amplifiersandOscillators.
		CO 3	Analyze various configurations of single stage and multistage amplifiers.
		CO 4	Analyze the operation and characteristics of Power Amplifiers.
		CO 5	Interpret the characteristics and applications Operational Amplifier.
ELECTROMAGNETIC FIELDS	20EE2004	**CO 1**	Ability to identify appropriate coordinate systems and visualize and understand the practical significance of vector calculus
		CO 2	Understanding of the basic laws of electrostatics, Ability to compute, visualize electrostatic fields along with practical applications
		CO 3	Understanding of the basic laws of magnetostatics
		CO 4	Ability to compute, visualize magneto static fields along with practical applications
		CO 5	Understanding of Maxwell's equations in different forms and medium
INDUCTION MOTORS AND SYNCHRONOUS MACHINES	20EE2005	**CO 1**	To acquire the basic knowledge of construction, working and operation ofinduction motor.
		CO 2	Identify different speed controlling techniques of Induction motor for the given application.
		CO 3	To impart knowledge on Construction and performance of salient and non – salient type synchronous generators and determine how several alternators running in parallel share the load on the system.
		CO 4	Analyze the performance characteristics of synchronous motors.

		CO 5	To impart knowledge on Construction, principle of operation and performance ofsingle phase induction motors and special machines.
LINEAR CONTROL SYSTEMS	20EE2006	**CO 1**	Determine the transfer function for the given electrical or mechanical systems and also determine the transfer function of a system using block diagram reduction techniques and Mason's gain formula
		CO 2	Analyze the system behaviour in time domain and step response to various dampings.
		CO 3	Determine the stability of given system by applying Routh's stability criteria.
		CO 4	Analyze the stability of given system by means of Bode plot and polar plot
		CO 5	Determine the state model and assessment of controllability & observability from thegiven transfer function.
POWER GENERATION & TRANSMISSION	20EE2007	**CO 1**	Understand the working principle and operation of thermal power plant.
		CO 2	Understand the working principle and operation of hydro & Nuclear power plant.
		CO 3	Understand the working principle and operation of various Renewable energy sources.
		CO 4	Analyze and compute the transmission line parameters.
		CO 5	Analyze the performance of transmission Lines
ANALOG ELECTRONIC CIRCUITS AND SIMULATION LAB	20EE2503	**CO 1**	Measure various parameters of analog circuits and compare experimental results in the laboratory with theoretical analysis.
		CO 2	Analyze negative feedback amplifier circuits, oscillators, Power amplifiers, Tuned amplifiers.
		CO 3	Design analog electronic circuits using discrete components
		CO 4	Design RC and LC oscillators, Feedback amplifier for specified gain and multistage amplifiers for Low, Mid and high frequencies.
Digital Electronics & Logic Design Digital Electronics & Logic Design	20EE2008	**CO 1**	Use number systems, binary codes and Boolean algebra to implement digital circuits.
		CO 2	Apply minimization techniques on Boolean expressions.
		CO 3	Design combinational circuits using logic gates.
		CO 4	Analyze synchronous sequential circuits.
		CO 5	Classify the memories & programmable logic devices.

POWER DISTRIBUTION & DISTRIBUTED GENERATION	20EE2009	**CO 1**	Compare the advantages & disadvantages of various distributed generation.
		CO 2	Describe various Distributed Generation systems, Micro-grid and storage devices
		CO 3	Illustrate the Economic and control aspects of DGs
		CO 4	Analyze the different load characteristics, distribution factors & Modelling of distribution system.
		CO 5	Design of Distribution Feeders, Voltage Drop and power loss in D.C Distributors.
POWER ELECTRONICS	20EE2010	**CO 1**	Describe the operation of power semiconductor devices
		CO 2	Illustrate the construction and operation of silicon controlled rectifier
		CO 3	Analyze the various uncontrolled rectifiers and design suitable filter circuits
		CO 4	Demonstrate the operation of the DC-DC converters and inverters
		CO 5	Summarise the operation of AC controllers.
Control systems & Simulation Lab	20EE2505	**CO 1**	Determine the transfer functions of various system
		CO 2	Analyse the knowledge about the effect of poles and zeros location on transient and steady state behaviour of second order systems and can implement them to practical systems
		CO 3	Model the systems and able to design the controllers and compensators
		CO 4	Get the Practical Knowledge for Time response of second order systems
		CO 5	Determine the performance and time domain specifications of first and second order systems
		CO 6	Determine the stability analysis of different system by using PSPICE and MATLAB
Power Electronics Lab	20EE2506	**CO 1**	The student will analyze the characteristics of power semiconductor devices & P SpiceSimulation
		CO 2	1. To Perform Laboratory Experiments practically.
		CO 3	To carry out laboratory experiments on simulation & Kits.

Electrical Measurements and Instrumentation	20EE2011	**CO 1**	Describe the concepts and principles of Measuring Instruments to measure voltage andcurrent.
		CO 2	Analyze the working principles of single and three phase wattmeters & energy meter tomeasure power and energy in circuits.
		CO 3	Demonstrate the concepts and principles of AC and DC bridges to evaluate resistance, inductance and Capacitance for AC and DC Circuits.
		CO 4	Demonstrate the operating principles of instrument transformers and potentiometer to measure unknown voltage, Current & Resistance in circuits.
		CO 5	Identify the physical variables to describe operating principle of the transducers.
MODERN POWER SYSTEM ANALYSIS	20EE2012	**CO 1**	Discuss the Representation of power system matrices with formation of YBUS .
		CO 2	Describe the Representation of power system matrices with formation of ZBUS .
		CO 3	Apply the concepts of algorithm for the given power system network.
		CO 4	Analyse the symmetrical faults and unsymmetrical faults of a power system network.
		CO 5	Develop the steady State, Dynamic and Transient Stabilities for a power system.
Switch Gear & Protection	20EE2013	**CO 1**	Demonstrate the operation of different types of Circuit Breakers
		CO 2	Describe the operation & application of various types of protective relays.
		CO 3	Compare the different types of comparators.
		CO 4	Analyze the various protection schemes of various power system components likealternators, transformers and bus-bars.
		CO 5	Illustrate the various methods of over voltage protection in power systems
MEASUREMENT & INSTRUMENTATION LAB	20EE2507	**CO 1**	Accurately determine the values of inductance and capacitance using a a.c bridges
		CO 2	Compute the coefficient of coupling between two coupled coils
		CO 3	Calibrate various electrical measuring instruments
		CO 4	Accurately determine the values of very low resistances
POWER SYSTEM LAB	20EE2508	**CO 1**	Examine the power system analysis
		CO 2	Identify characteristics of various Relays
		CO 3	Understand various tests on Motors and Transformers

Solid State Electrical Drives	20EE2014	**CO 1**	Describe the basic requirements of motor selection for different load profiles.
		CO 2	Analyze the operation of the converter fed dc drive
		CO 3	Demonstrate the operation of the chopper fed dc drive
		CO 4	Illustrate the operation and performance of AC Induction motor drives
		CO 5	Analyze the induction motor drive using inverter
POWER SYSTEM OPERATION & CONTROL	20EE2015	**CO 1**	Enumerate the Heat rate curves, Economic operations of power systems
		CO 2	Describe the Hydrothermal power stations Scheduling
		CO 3	Discuss the single area load frequency control, modelling of turbines , speed governing systems.
		CO 4	Illustrate two area load frequency control , tie line and economic dispatch control for load frequency control.
		CO 5	Discuss the deregulation and conditions of deregulation in a power systems.
POWER SYSTEM SIMULATION LAB	20EE2510	**CO 1**	Examine the power system analysis
		CO 2	Construct the controllers of a power system.
		CO 3	Analyze the various power system stabilities
INDUSTRIAL ELECTRICAL SYSTEMS	20EE4001	**CO 1**	Understand the electrical wiring systems for residential, commercial and industrialconsumers through symbols, drawings and SLD
		CO 2	Justify the need of industrial electrical system components and industrial automation
		CO 3	Analyze the size, rating and cost of electrical installations for residential and commercial applications
		CO 4	Analyze the appropriate electrical system with protective equipments for industrial applications
		CO 5	Understand the role of industrial automation
POWER SYSTEM PLANNING	20EE4006	**CO 1**	Discuss primary components of power system planning, planning methodology foroptimum power system expansion and show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools.
		CO 2	Discuss methods to mobilize resources to meet the

			investment requirement for thepower sector and understand economic appraisal to allocate the resources efficiently and appreciate the investment decisions to power generation and planning for system energy in the country
		CO 3	Analyze the operating states of transmission system, their associated contingencies and the stability of the system and discuss principles of distribution planning,supply rules, network development and the system studies.
		CO 4	Discuss reliability criteria for generation, transmission, distribution and reliability evaluation and analysis, grid reliability, voltage disturbances and their remedies
		CO 5	Discuss planning and implementation of electric – utility activities, market principles and the norms framed by CERC for online trading and exchange in the interstate power market.
Reactive Power Compensation and Management	20EE4011	**CO 1**	Distinguish the importance of load compensation in symmetrical as well as un symmetrical loads
		CO 2	Observe various compensation methods in transmission lines
		CO 3	Construct model for reactive power coordination
		CO 4	Understand the demand side reactive power management
		CO 5	Understand the user side reactive power management
POWER QUALITY	20EE4016	**CO 1**	Address power quality issues to ensure meeting of standards
		CO 2	Apply the concepts of compensation for sags and swells using voltage regulating devices
		CO 3	Assess harmonic distortion and its mitigation.
		CO 4	Understand the power measurement data according to standards
		CO 5	Analyze the power quality improvement with custom power devices
SMART GRID TECHNOLOGIES	20EE4021	**CO 1**	Understand technologies for smart grid
		CO 2	Understand the smart transmission system and its technologies
		CO 3	Understand the smart distribution system and its technologies
		CO 4	Realize the distribution generation and smart consumption

		CO 5	Know the regulations and market models for smart gri
System Modelling and Identification	20EE4002	**CO 1**	Learn the design of Modelling of Dynamic Systems
		CO 2	Analyze the Stability margins, correlation of frequency domain and time domain
		CO 3	Analyse linear sampled data systems
		CO 4	Learn the computation Z-transform
		CO 5	Understand the compensation in Z domain and W plane
ADVANCED CONTROL SYSTEMS	20EE4007	**CO 1**	Learn the design of state feedback controller and state observer
		CO 2	Analyze the linear and nonlinear systems using phase plane method.
		CO 3	Analyse nonlinear systems using describing function method..
		CO 4	Learn the optimal control problem
		CO 5	Understand the Solution of Kalman Filter by duality principle, Direct method of Lypanov forLinear and Nonlinear continuous time autonomous systems.
Digital Signal Processing	20EE4012	**CO 1**	Understand Discrete-time signals and systems & properties
		CO 2	Analyze the z- Transform, inverse z- Transform & properties
		CO 3	Understand the design of low pass, high pass, band pass & stop band IIR digital filters
		CO 4	Learn Computer aided design of Equiripple Linear phase FIR filters
		CO 5	Understand arithmetic round off errors, Low sensitivity digital filters.
MULTIVARIABLE CONTROL SYSTEMS	20EE4017	**CO 1**	Learn the Multivariable Connections, Multivariable Representation
		CO 2	Analyze the Performance Specification in Multivariable Systems.
		CO 3	Analyse Stability of Multivariable Feedback
		CO 4	Learn the Controllability and Observability and Realization in Multivariable Systems
		CO 5	Understand the Multivariable Control System Design
REAL TIME CONTROL SYSTEMS	20EE4022	**CO 1**	Analyze the Characteristic features of RT applications and develop features from Non - RT and Off - line system
		CO 2	Understand the Hierarchical representation and analyzing Logical properties
		CO 3	Derive the Example of checking safety and timing properties and also understand the Requirements and features of real - time Computing Environments
		CO 4	Understand and analyze the Real – time Programming for real-time systems.
		CO 5	Analyze the Real - time process, Applications and understand the Distributed Real - time systems
MACHINE	20EE4003	**CO 1**	Understand the basic concepts of AC/ DC machine modeling.

MODELING AND ANALYSIS		**CO 2**	Understand the Mathematical model of the DC Machine.
		CO 3	Analyze the Reference frame theory model of Electrical machine.
		CO 4	Analyze the steady state and dynamic state operation of three-phase induction machine.
		CO 5	Analyze the modeling and simulation of three phase synchronous machine .
Electrical Machine Design	20EE4008	**CO 1**	Understand the basic principles of machine design.
		CO 2	Analyze the performance design DC motor.
		CO 3	Analyze the performance design winding and core of transformer.
		CO 4	Analyze the performance design winding and core of rotating electrical machine.
		CO 5	Analyze the short circuit ratio and its effects on performance of synchronous machines.
Programmable Control Devices and Applications	20EE4013	**CO 1**	Understand different types of PLCs
		CO 2	Understand the usage of Easy Veep software
		CO 3	Understand the hardware details of Allen Bradley PLC .
		CO 4	Programming of PLCs .
		CO 5	Know about few applications of PLCs in different fields of Science and Technology .
HYBRID ELECTRICAL VEHICLES	20EE4018	**CO 1**	Understand the models to describe hybrid vehicles and their performance
		CO 2	Classify various hybrid drive-train topologies
		CO 3	Understand the various configurations of DC & AC Motor drives.
		CO 4	Understand the different possible ways of energy storage and different strategies related to Energy management strategies.
		CO 5	Understand the mode of operation and control Architecture.
AUTOMOTIVE ELECTRICAL ENGINEERING	20EE4023	**CO 1**	Compute the efficiency of Batteries through various test's
		CO 2	Understand the working of different starter drive units and their maintenance andthe concept of vehicle charging system with its auxiliaries
		CO 3	Understand the dazzling of head light and its preventive methods
		CO 4	Understand the electronic dashboard instruments & onboard diagnostic system
		CO 5	Understand the various sensors used in Automobiles
RENEWABLE	20EE4004	**CO 1**	Understand various Electric Energy Conversion

ENERGY CONVERSION SYSTEMS			Systems
		CO 2	Analyze the solar thermal conversion system (Also for high temperature applications)
		CO 3	Analyze the Photovoltaic & Bio-Energy Conversion Systems
		CO 4	Illustrate the existing Wind Energy Conversion System
		CO 5	Extend the knowledge about working principle of various Fuel cell technology
Electrical Machine Design	20EE4008	**CO 1**	Understand the basic principles of machine design.
		CO 2	Analyze the performance design DC motor.
		CO 3	Analyze the performance design winding and core of transformer.
		CO 4	Analyze the performance design winding and core of rotating electrical machine.
SOLAR AND FUEL CELL ENERGY SYSTEMS	20EE4009	**CO 1**	Understand the need of radiation of sun and discuss the various performance characteristics of solar radiation.
		CO 2	Discuss the photovoltaic effect, PV Cell efficiency and its limits along with the concepts of fabrication technology for solar cell
		CO 3	Predict the performance of solar photovoltaic device and analyze its performance.
		CO 4	Carry out the application of photovoltaic system as power system.
		CO 5	Analyze the performance of fuel cells under different operating conditions and alsodefend appropriate fuel cell technology for a given application.
WIND & BIOMASS ENERGY SYSTEM WIND & BIOMASS ENERGY SYSTEM	20EE4014	**CO 1**	Understand the present wind energy scenario
		CO 2	Explain the various wind energy technologies.
		CO 3	Identify various applications of wind energy .
		CO 4	Explain the various biomass conversion technologies and testing of performance of biogas.
		CO 5	Understand the Bio-Energy Systems with Efficient Applications.
UTILIZATION OF ELECTRICAL ENERGY	20EE4019	**CO 1**	Utilize the suitable electric drives for different applications
		CO 2	Analyze the Speed-Time Curves of Different Services
		CO 3	Identify the energy saving based on Illumination system (BL=3)
		CO 4	Understand the utilization of electrical energy

			for heating and welding Purposes
		CO 5	Illustrate the effective usage of solar wind energy for electrical applications
ENERGY AUDIT & DEMAND SIDE MANAGEMENT	20EE4024	**CO 1**	Understand the importance of energy audit and the basic ideas of conduction anenergy audit
		CO 2	Analyze various techniques of energy management and conservation
		CO 3	Understand energy efficient methods and power factor improvement techniques
		CO 4	Analyze demand side management concepts through case study
		CO 5	Understand various Cost effectiveness test for demand side management programs
ADVANCED POWER ELECTRONICS	20EE4005	**CO 1**	Explain basic Concept of Switches and their controlling process
		CO 2	Demonstrate the device physics, Application and Analysis of Switches in DC-DC converters and Single Phase Converter
		CO 3	Analyze the operation Single Phase Converter, Three Phase Converter, Multipulse Converter and Effect of Source Inductance and PWM Rectifiers
		CO 4	Analyze the Power Quality Improvement Techniques in electrical systems
		CO 5	Analyze the applications of FACTS Devices in electrical system
ADVANCED ELECTRICAL DRIVES	20EE4010	**CO 1**	Analyze the Power electronic converters for electrical drives.
		CO 2	Analyze the field oriented control of machines.
		CO 3	Understand the vector control of electrical drives.
		CO 4	Understand the sensor less control of AC drives.
		CO 5	Analyze the direct torque control of Induction Machines.
HVDC and FACTS	20EE4015	**CO 1**	Find the applications of different types of HVDC links.
		CO 2	Apply converters for HVDC transmission for control of converters.

		CO 3	Understand the concept of filters to mitigate harmonics, concept of reactive powerrequirements.
		CO 4	Understand the working principles of FACTS devices.
		CO 5	Analyze the performance of Series, Shunt and combined FACTS controllers.
ADVANCED POWER CONVERTERS	20EE4020	**CO 1**	Evaluate different dc-dc voltage regulators
		CO 2	Analyze resonant converters
		CO 3	Evaluate various multi-level inverter configurations
		CO 4	Select appropriate phase shifting converter for a multi-pulse converter
		CO 5	Analyze the various DC power supplies
ADVANCED POWER SEMICONDUCTOR DEVICES AND PROTECTION	20EE4025	**CO 1**	Analyze power switching devices
		CO 2	Design of current controlled devices and their parameters
		CO 3	Analyze the voltage controlled devices and their parameters
		CO 4	Understand new power semiconductor devices
		CO 5	Design of protecting circuit