Course Code	Course Name	Course Outcomes
14211001	Mathematics-1	CO-1. Modeling of certain physical phenomena into appropriate matrices and their transformations.
		CO- 2. Transforming line integrals, double and triple integrals into one another in solving mathematical models of some engineering applications.
		CO- 3. Students shall apply Laplace transform techniques in Transient and steady state analysis of electrical circuits, analysis of Structural engineering problems such as deflection of beams, columns etc.
		CO-4. Students are able to understand and apply Green's, Stoke's and Gauss-divergence theorems in solid mechanics, fluid mechanics, electrical engineering and various other fields.
14211002	Mathematics-2	CO-1. Students are able to understand and apply differential equations in solving Hydrodynamics, Electromagnetic fields and Fluid mechanics problems.
		CO- 2. Students are able to understand and apply Numerical Methods in solving Simultaneous equations and Transcendental equations.
		CO-3. Solving engineering problems that can be modeled as ordinary differential equations without finding general solutions.
		CO-4. Students are able to apply Fourier transform techniques to solve the Differential and Partial Differential equations that may arise in electrical circuits, analysis of Structural engineering problems such as deflection of beams, columns etc**.**
14221003	Engineering Physics	• CO-1. The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
		• CO-2. The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with ultrasonic non-destructive technique.
		• CO-3. The properties and device applications of semiconducting and magnetic materials are illustrated.

		• CO-4.The importance of super conducting materials and Nano-Materials along with their engineering applications is well elucidated
14231004	Engineering Chemistry	CO-1. Graduate will be able to apply the knowledge of chemistry to identifying and addressing the problems of boilers in industry.
		CO-2. Graduate will be able to appreciate the use of high polymers in engineering uses.
		CO-3. Graduate will demonstrate the knowledge of Fuels and lubricating oils in Engines.
		CO-4. Graduate will be able to appreciate the appropriate analytical methods in chemical analysis using instrumentation.
14241005	English	CO-1. Have improved communication in listening, speaking, reading and writing skills in general.
		CO-2. Have developed their oral communication and fluency in group discussions and interviews.
		CO-3. Have improved awareness of English in science and technology context.
		CO-4. Have achieved familiarity with a variety of technical reports.
14031006	Engineering Drawing	CO-1.Apply principles of drawing in representing dimensions of an object.
		CO-2.Construct polygons and curves.
		CO-3.Draw projections of points, lines, planes and solids in different positions.
		CO-4.Convert the orthographic views into isometric views and vice versa.
14051007	Problem Solving & Programming in C	CO-1. Able to understand the basic building blocks of C.
		CO-2. Able to use logical structure and control structures of a computer program.
		CO-3. Able to describe the use of arrays and modular programming
		CO-4. Able to illustrate the use of memory allocation and file handling functions.
		CO-1.Use marking tools, measuring tools, cutting tools (chisels, saws) used in carpentry and fitting trades to prepare basic carpentry and fitting joints.

14991008	Engineering Workshop	CO-2.Prepare Foundry jobs like single piece pattern and double piece pattern.
		CO-3. Make basic house wire connections.
		CO-4.Fabricate tin smithy jobs using snips, stakes and wooden mallet.
		(IT-Workshop)
		CO-5. Able to assemble and disassemble the PC.
		CO-6. Able to install Windows OS.
		CO-7. Able to work with MS-Office.
		CO-8. Able to Browse the Internet.
14051009	Programming in C Lab	CO-1. Able to write, compile and debug programs in C language and use different data types in a computer program.
		CO-2. Able to implement programs involving decision structures, loops, arrays and functions on different applications.
		CO-3. Able to implement the modular programming concepts, pointers, structures and unions.
		CO-4. Able to develop the concepts of file I/O operations and random access to files
14991010	Engineering Sciences Lab	CO-1. Graduate will be able to apply the knowledge of physics laboratory in measuring the standard values.
		CO-2. Graduate will correlate the theory and experimental results.
		CO-3. Graduate will be able to apply the knowledge of chemistry laboratory in identifying and addressing the problems in hardness of water.
		CO-4. Able to appreciate the appropriate analytical methods in chemical analysis using instrumentation.
14241011	English Language and Communication Skills Lab	CO-1. Have improved communication in listening, speaking, reading and writing skills in general.
		CO-2. Have developed their oral communication and fluency in group discussions and interviews.
		CO-3. Have improved awareness of English in science and technology context.
		CO-4. Have achieved familiarity with a variety of technical reports.

14212101	**Mathematics-III**	CO1: Study about special functions like Beta Function nd Gamma Function and their properties
		CO2: Get understanding of functions of Complex Variables
		CO3: Learn the concepts relqated to Complex Integration
		CO4: Evaluate residues by formula
14012102	**Environmental Studies**	On successful completion of this course, the students will be able to
		CO1. Demonstrate knowledge on
		• the processes and various factors involved in the formation of environment.
		• Recognize the importance of environment and the sustainable of natural resources.
		CO2. Analyze
		• interaction between social and environmental processes.
		• Use scientific reasoning to identify and understand environment problems and evaluate potential solutions.
		CO3. Visualize the impacts of human activities on environment and role of society in these impacts.
		CO4. Recall critically about their role as citizens, consumers and environmental factors in an inter connected world.
14112103	**Fluid Mechanics & Hydraulic Machinery**	On successful completion of this course, the students will be able to
		CO1. demonstrate knowledge on:
		• properties and laws of fluid mechanism
		• flow through pipes and its measurements.
		• different types of jets & turbines and their performance & applications in power plants.
		• operational aspects of different pumps.
		CO2. Analyze
		• various instruments to measure the flows and estimate the losses.
		• performance of different types of jets and turbines used in power plants.

		• operational characteristics of different types of pumps.
		CO3. Demonstrate skills in solving problems related to hydrostatic pressure using fundamentals of hydraulics.
		CO4. Evaluate
		• flow discharge, losses in pipes using flow measuring instruments.
		• characteristic parameters of different jets and turbines used for power plants
		characteristic parameters of pumps
14042104	**Electronic Devices and Circuits**	CO1. Gain practical knowledge of the principles of operation and characteristics of pn Junction diodes, Zener diodes, Photodiode and Phototransistor.
		CO2. Able to analyze and design pn Junction diode Rectifier circuits.
		CO3. Able to design BJT & FET Amplifiers and analyze their frequency response
		CO4. Demonstrate the knowledge in LED, SCR and UJT in future applications
14022105	**Circuit Theory**	On successful completion of the course, student will be able to
		CO1. Identify the types of sources present, elements in the circuit and also apply the Kirchhoff's laws for the given simple circuits
		CO2. Analyze the responses of the circuits excited by single phase AC source and also they can draw the Phasor diagrams
		CO3. Find the resonance condition for the Given RLC circuits and also plot the locus diagrams
		CO4. An idea on magnetic properties and their circuits
		CO5. Convert the given circuit in to matrix using different methods to analyze the behavior of the network
		On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• different types of singly- and multi- excited magnetic field systems.

14022106	**Electrical Machines – I**	• construction, operation and characteristics of DC machines.
		• armature reaction and commutation.
		• Starting methods and speed control of DC motors.
		• testing of DC machines.
		CO2. Analyze the operation of DC machine under various operating conditions.
		CO3. Design armature windings for DC machines and starters for DC motors.
		CO4. Evaluate the performance of DC machines by different testing methods
		CO5. Choose suitable DC machine for domestic and industrial applications.
14112107	**Fluid Mechanics & Hydraulic Machinery Lab**	On successful completion of this course the students will be able to
		CO1. Demonstrate knowledge on different types of flow and discharge measuring instruments, turbines and pumps.
		CO2. Analyze
		▪ calibration of different types of flow and discharge measuring instruments. .
		• different models for estimating the losses in pipes.
		▪ performance of different types of jets, turbines and pumps.
		CO3. able to design a suitable piping system to meet the needs of industry and domestic applications.
		CO4. function effectively as individual and as member in a team.
14042108	**Electronic Devices and Circuits Lab**	CO1. Gain practical knowledge of the principles of operation and characteristics of pn-diodes, Zener diodes, Photodiode and Phototransistor
		CO2. Able to analyze and design pn-diode Rectifier circuits
		CO3. Able to design BJT & FET Amplifiers and analyze their frequency response
		CO4. Demonstrate the knowledge in LED, SCR and UJT in future applications

14042201	**Switching Theory & Logic Design**	CO1. Learn the concepts of number systems, Boolean Algebra and K-Maps that are essential to minimize the logical functions in the design and development of digital systems.
		CO2. Design and develop various combinational and sequential circuits.
		CO3. Demonstrate the ability to realize Switching functions using Programmable Logic Devices.
		CO4. Solve engineering problems pertaining to Digital Electronics and arrive at solutions.
14042202	**Analog Electronic Circuits**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• Frequency responses of BJT and FET.
		• Different types of Amplifiers.
		• Oscillators and wave shaping circuits.
		• Switching characteristics of diode and transistor.
		• Multivibrators using transistors.
		CO2. Analyze
		• effect of feedback on amplifier characteristics.
		• Frequency and amplitude stability of oscillators.
		• Characteristics of various clipper and clamper circuits.
		• The operation of multivibrator circuits
		CO3. design
		• feedback amplifier circuits with different parameters.
		• Transistor switching circuit.
		• Multivibrator circuits.
		CO4. Evaluate the feedback parameters of amplifier circuits, clipper and clamper circuits.
14022203	**Generation of Electrical Power**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• layout of various power plants and their operation.
		• combined operation of power stations.
		• concept of different types of turbines and their usage in different types of power generation stations.

		CO2. Analyze the water power equation.
		CO3. Analyze load sharing between power stations.
		CO4. Evaluate reserve capacity of Hydel power plant using mass curve.
14022204	**Electromagnetic Fields**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on:
		• Electro Static and Magnetic Fields due to electric charges and Steady Currents
		• Time varying electric and magnetic fields
		CO2. Analyze the Maxwell's equations for both time variant and invariant electric and magnetic fields.
		CO3. Evaluate
		• Electric field by Coulomb's Law and Electric field and Capacitance by applying Gauss's law.
		• Magnetic field and inductance by applying Ampere's circuital law.
		CO4. Apply various laws of electromagnetic to study the performance of electric machines.
14022205	**Network Theory**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• star/delta connections with balanced/unbalanced conditions
		• transient analysis of DC and AC excitations.
		• Two-port network parameters
		• Fourier analysis of AC circuits and Fourier transforms
		CO2. Analyze
		• RL, RC and RLC circuits for DC and AC excitations
		• Electrical circuits for non-sinusoidal periodic waveforms
		CO3. Design the network elements using two-port parameters.
		CO4. Evaluate
		• Voltage, Current and Power for balanced and unbalanced 3 phase systems

		• Transient behavior using differential equations and Laplace transforms.
		• Two port parameters namely Z, Y, ABCD, h and g.
14022206	**Electrical Machines – II**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• construction and working of transformers, auto transformers and induction machines.
		• testing of transformers and induction machines.
		• parallel operation of transformers
		• Speed control of induction motors
		CO2. Analyze the behavior of transformers and induction machines for various operating conditions.
		CO3. Design suitable accessories/techniques for the starting and speed control of induction motors.
		CO4. Categorize the suitable transformer and induction machine for domestic, agriculture and industrial applications.
14022207	**Electrical Circuits and Simulation Lab**	On successful completion of the course, student will be able to
		CO1. Demonstrate skills in
		• Network Theorems for DC and AC
		• Two - port network parameters
		• Measurement of active and reactive power
		• Resonance and Locus Diagrams
		• Coupling coefficient
		CO2. Obtain two-port network parameters
		CO3. Analyze RL, RC and RLC circuits
		CO4. Function effectively as individual and as member in a team.
		On successful completion of the course, student will be able to
		CO1. Demonstrate skills in
		• identify various parts of DC machine and different types of starters
		• Obtaining various characteristics of DC machines.

14022208	**Electrical Machines – I Lab**	• Determining the performance of DC machines.
		• Separating losses in DC machines.
		CO2. Analyze the performance of various DC machines and decide suitability for a given application
		CO3. Function effectively as individual and as member in a team.
		CO4. Communicate effectively both oral and written.
14253101	**Managerial Economics And Financial Analysis**	On successful completion of the course, student will be able to
		CO1. Expected to achieve the overall course objective to understand and enhancing the knowledge in managerial economics
		CO2. Enhancing the knowledge of managerial concepts and obtaining optimal solutions
		CO3. To get an idea of analysis of firm's financial position
		CO4. With the techniques of financial analysis and ration enhancing the knowledge regarding accounting system and obtaining accuracy in financial matters.
14143102	**Linear& Digital Integrated Circuit Applications**	CO1. Apply OP-AMPs in various IC applications
		CO2. Use the knowledge of DC and AC characteristics of operational amplifiers that are essential in design and simulation of analog systems and subsystems
		CO3. Apply multivibrator circuits using OP-AMPs and 555 timers and study the applications of Phase Locked Loops in Communication Systems.
		CO4. Able to use computer-aided tools for development of complex digital logic circuits
		CO5. Able to design tests for digital logic circuits, and design for testability
		On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• modelling of physical systems
		• time and frequency domain specifications used for stability analysis.
		• various methods of determining the stability of the system

14023103	**Control Systems**	• realization of various compensators
		CO2. analyze the stability of the system in time and frequency domains.
		CO3. Design lag, lead, lag-lead compensators in frequency domain.
		CO4. Evaluate
		• the transfer function using block diagram reduction technique and signal flow graph.
		steady state error and static error constants.
14023104	**Power Electronics**	On successful completion of the course, student will be able to
		CO1. demonstrate potential knowledge on
		• the characteristics of various power transistors.
		• operation, switching characteristics, ratings, protection and combinations of SCR.
		• various triggering methods and commutation techniques for SCR.
		• operation of line commutated converters and SCR based force commutated converters.
		CO2. analyze the performance of different power converters subjected to various loads.
		CO3. design static and dynamic equalizing circuits, snubber circuits and commutating elements.
		CO4. Evaluate number of SCRs required for desired series /parallel operation, electrical parameters and different variables of various power electronic circuits.
		On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• transmission line parameters and their performance.
		• transients in transmission lines.
		• Overhead line insulators, Sag and Tension calculations for transmission system.
		• corona, classification of cables and their performance.
		CO2. analyze

14023105	**Power Systems – I**	• the electrical and mechanical aspects of transmission lines.
		• the capacitance of cable for different configurations.
		CO3. design
		• electrical and mechanical systems to improve the overall performance of transmission lines and cables.
		• Overhead Line Insulators.
		CO4. exhibit skills in
		• evaluating the parameters and performance of transmission lines and cables.
		• evaluating the electrical and mechanical aspects of transmission lines, cables and insulators.
14023106	**Electrical Machines – III**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• Constructional details, working, characteristics and performance of a synchronous machines, fractional kilowatt motors.
		• armature reaction, regulation and synchronization of alternators.
		• Performance of salient pole machines
		• starting methods of synchronous motor and its performance evaluation using circle diagrams.
		CO2. analyze the operation of synchronous and single phase machines for various operating conditions.
		CO3. evaluate the performance and various parameters of synchronous machines and fractional kW motors.
		CO4. identify a suitable machine for domestic and industrial applications.
14023107	**Power Electronics Lab**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on
		• power electronic devices such as SCR, MOSFET, IGBT.
		• Static V-I characteristics of power electronic devices
		• Conversion techniques such as AC-DC, AC-AC,DC-AC and DC-DC.
		CO2. Analyze the performance parameters of different types of bridge converters.

		CO3. Evaluate the performance parameters of half controlled, fully controlled rectifiers, AC voltage controllers and cyclo converters.
		CO4. function effectively as individual and as member in a team.
14023108	**Electrical Machines – II Lab**	On successful completion of the course, student will be able to
		CO1. demonstrate knowledge on identification of parts of transformers and AC machines.
		CO2. analyze the performance of Transformers and AC machines.
		CO3. design the experimental circuit based on loading and rating of the transformers and AC machines.
		CO4. demonstrate skills in
		• obtaining the various characteristics of Transformers and AC machines.
		• determining the performance characteristics of Transformers and AC machines.
		• Determining and separation of losses in Transformers and AC machines.
14143201	**Micro Processors & Microcontrollers**	CO1. This course describes the Architecture and instruction set of 8085 Microprocessors.
		CO2. This course describes the Architecture and instruction set of 8086 Microprocessors
		CO3. Students get the ability to write programs and execute using 8086 Microprocessor.
		CO4. They know about data transfer schemes and Interface the 8086 Microprocessor to the outside world
		CO5. This course describes the Architecture and instruction set of 8051Microcontrollers
		CO6. Students get the ability to write programs and execute using 8051 Microcontroller.
		On successful completion of the course, student will be able to

14023202	**Electrical & Electronic Measurements**	CO1. Demonstrate knowledge on
		• various errors and compensation
		• construction, working and testing of various measuring instruments.
		• measurement of various electrical parameters and quantities
		CO2. Analyze
		• different types of errors and compensations
		• DC and AC bridges.
		CO3. Design extension of meter ranges of various measuring instruments.
		CO4. Evaluate various electrical circuit parameters/elements using bridges.
		CO5. apply various measuring instruments in domestic and industrial applications.
14023203	**Advanced Control Systems**	On successful completion of this course, student will be able to
		CO1. Gain knowledge on
		• State space representation,
		• Controllability, bservability and pole placement
		• non-linear system
		• optimal control
		CO2. Analyze
		• stability of a non-linear system using describing functions and phase plane analysis.
		• non-linear system stability using Lyapunov's stability criterion.
		• minimization of functional with different cases.
		CO3. Demonstrate design skills in controllers, observer and regulators using state space.
		CO4. Evaluate
		• controllability, observability of linear systems.
		• evaluating stability of systems using describing functions and liapunov stability

		application of calculus of variations
14023204	**Power Semiconductor Drives**	On successful completion of course the student will be able to
		CO1. demonstrate knowledge on
		• dynamics of electrical drives.
		• operation and speed control of various DC and AC drives in open loop.
		• closed loop control of converter fed motors.
		• Energy conservation in electrical drives
		CO2. analyze single and multi-quadrant operations of DC and AC drives with speed - torque characteristics.
		CO3. evaluate control parameters for speed control of electrical motors fed by power electronics modulators.
		CO4. Design rectifier control of DC drives, Inverter control of AC drives.
14023205	**Power Systems – II**	On successful of the course, student will be able to
		CO1. Demonstrate knowledge on
		• Transmission line parameters and their performance.
		• Per unit system, single line diagrams, reactance and impedance diagrams.
		• Importance of earthing
		CO2. Analyze
		• modeling of power system components
		• Different types of faults in power systems
		CO3. Design
		• location of current limiting reactors.
		• Earthing grid for power systems.
		CO4. exhibit skills in
		• evaluating the parameters and performance of transmission lines.
		• evaluating the fault currents and fault levels.
		CO1. Get the knowledge of discrete time signals and systems
		CO2. Apply Z-Transforms in digital system design

14143206	**Digital Signal Processing**	CO3. Write algorithms for Fast Fourier Transforms
		CO4. Realize Digital Filters
		CO5. Design IIR and FIR filters for the desired characteristics.
14023207	**High Voltage DC Transmission**	On successful completion of course the student will be able to
		CO1. demonstrate knowledge on Converter Circuits.
		CO2. analyze the applications of high voltage transmission system.
		CO3. Analyze the protection system for HVDC transmission
		CO4. Design the filters for DC transmission.
14153208	**Object Oriented Programming through JAVA**	At the end of this course the students will be:
		CO1. Able to apply object oriented programming features and concepts for solving given problem.
		CO2. Able to use java standard API library to write complex programs .
		CO3. Able to implement object oriented programming concepts using java
		CO4. Able to develop interactive programs using applets and swings.
14243209	**Advanced English communication Lab(Audit Course)**	After completion of the course, a successful student will be able to:
		CO1. Acquire knowledge in
		• Speech Sounds
		• Stress Patterns
		• Intonation and Rhythm
		CO2. Analyze the functional knowledge of English Grammar for writing and speaking correct English in academic, professional and personal contexts.
		CO3. Communicate effectively with engineering community and society in formal and informal situations.
		CO4. Inculcate attitude to upgrade communicative competence for meeting global challenges.
		On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• performance of controllers on second order system
		• Performance of Synchros, armature controlled DC motor

14023210	**Control Systems Lab**	CO2. Analyze the characteristics of magnetic amplifier, Servomotor
		CO3. Design the bode plot, root locus, lag-lead compensation and state space model in MATLAB
		CO4. Evaluate stability of linear systems
14023211	**Electrical Measurements Lab**	On successful completion of this course, the students will be able to
		CO1. Demonstrate knowledge on
		• measurement of Passive elements in AC and DC Bridges.
		• measurement of power, power factor and energy.
		• Calibration of voltmeter and ammeter
		CO2. Evaluate the parameters of choke coil and dielectric strength of transformer oil.
		CO3. Application of different measuring instruments in the field of electrical engineering.
		CO4. function effectively as individual and as member in a team.
14254101	**Management Science**	On successful completion of this course, the student will be able to:
		CO1. employ fundamental knowledge on 'Management Thought' and 'Management of a business organization'.
		CO2. apply various Managerial concepts & contexts to attain 'Optimum Utilization of available organizational resources'.
		CO3. contribute to the group, as an individual, in accomplishing the stated objective of the business organization.
		CO4. apply gained knowledge on Management to establish and run his/her own organization, if he/she deserve to be an 'Entrepreneur'.
		CO5. Apply contemporary practices in applying Management and exercise discernment in implementing managerial decisions for ethical, safe and sustainable operations of the business.
		On successful completion of the course, student will be able
		CO1. Demonstrate knowledge on

14024102	**Power Systems – III**	• the formation of network matrices.
		• load flow studies.
		• Transients on power system.
		• power system stability.
		CO2. Analyze
		• the power flows and losses in the power system network using load flow analysis for different conditions.
		• the stability of the power system for different loading and faulted conditions.
		CO3. Demonstrate skills in evaluating
		• bus impedance and bus admittance matrices.
		• the load flow solution for a power system network for different conditions.
		• the various stability limits for various operating conditions.
		CO4. Apply the load flow and stability concepts to investigate various power system problems.
14024103	**Switch Gear & Protection**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• operation of various protective devices.
		• principles for power system protection components.
		• protection of electric equipment
		CO2. Analyze
		• fault current levels for different faults
		• operating aspects of protective devices
		• Different type of protection schemes
		CO3. Design proper protection scheme for different power system components.
		CO4. demonstrate skills in evaluating
		• operating parameters of various protecting devices
		• settings of protection devices in different protection schemes
		On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• Operation of various different types of FACTS controllers.

14024104	**Flexible AC Transmission Systems**	• Protection of utility appliances and control systems.
		• An ability to design the compensators with facts devices.
		CO2. Analyze
		Understand the importance of controllable parameters and benefits of FACTS controllers.
		• Know the significance of shunt, series compensation and role of FACTS devices on system control.
		CO3. Analyze the functional operation and control of GCSC, TSSC and TCSC.
		CO4. demonstrate skills in evaluating
		• FACTS devices are used in electrical power generation and its utilities.
		• These devices are used in different compensators and converters.
14024105	**Soft Computing Techniques**	On successful completion of the course, student will be able to
		CO1. Demonstrate the knowledge on learning strategies of an artificial neural network, components of fuzzy logic system and operators of genetic algorithm.
		CO2. Design fuzzy systems, neural networks and genetic algorithm for real time problems.
		CO3. Exhibit problem solving skills in fuzzy set theory and learning methods of neural net- works.
		CO4. apply various configurations of neural networks, fuzzy systems and genetic algorithms to different engineering applications.
14024106	**High Voltage Engineering**	COURSE OUTCOMES: On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• ehavior of various insulation materials
		• generation of high voltage and currents
		• measuring techniques for high voltage and currents
		• testing of various electrical apparatus

		CO2. Analyze the ehavior of insulation systems, circuits for generation and measurement of high voltages, materials used and measuring methods.
		CO3. Evaluate various parameters of high voltage generating circuits.
		CO4. apply a suitable testing method for a high voltage apparatus.
14024107	**Special Electrical Machines**	On successful completion of this course, student will be able to
		CO1. Gain knowledge on
		• special types of DC machines
		• stepper motors and their control
		• switched reluctance motor and its control
		• brushless DC motors and linear induction motors
		CO2. Analyze
		• the construction and performance of various special motors.
		• The drive circuits used for stepper and switched reluctance motor.
		CO3. Design drive circuits for stepper, switched and brushless DC motors.
		CO4. identify a suitable machine for various applications
14134108	**Optimization Techniques**	COURSE OUTCOMES: On successful completion of the course, student will be able to
		CO1. Demonstrate the knowledge on
		• classical optimization techniques.
		• theory and algorithms of linear and non-linear programming
		• transportation problem and dynamic programming
		CO2. Analyze standard manipulations of linear optimization problems, especially those related to duality.
		CO3. Evaluate optimization problems using modern packages.
		CO4. Demonstrate skills in identifying , formulating and solving engineering problems
		On successful completion of the course, student will be able to

14144109	**VLSI Design**	CO1. Understand the different fabrication steps involved in IC manufacturing
		CO2. Understand different subsystem designs.
		CO3. Able to convert the logic circuit into stick diagrams and layout.
		CO4. Analyze different electrical properties of MOS circuits.
14024110	**Reliability Engineering & Applications to Power Systems**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• elements of probability theory and probability distributions
		• network reduction techniques
		• markov odeling, frequency and duration techniques
		• Generation and Load Modelling
		• Composite System and Distribution System Reliability Indices
		CO2. Analyze
		• the failure rate distributions
		• different network reduction techniques
		• methods for identifying critical components
		• merging of generation with load model
		• system and load point reliability indices
		• customer, load and energy oriented indices
		CO3. Evaluate the power system networks using reliability concepts for adequacy and security
		CO4. apply
		• generation system reliability for calculating cumulative probability & frequency of various combined states
		• distribution system reliability analysis for radial networks to assess the performance of customers.
		On successful completion of this course, the students will be able to
		CO1. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.

14254111	**Professional Ethics (Audit Course)**	CO2. Students locate and apply case law and common law to current legal dilemmas in the technology field.
		CO3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
		CO4. Students distinguish enforceable contracts from non-enforceable contracts.
		CO5. Students demonstrate leadership and teamwork.
14144112	**Micro Processors & Micro Controllers Lab**	On successful completion of this course, the students will be able to
		CO1. Demonstrate knowledge on
		• performing arithmetic and logic operations by using MATLAB
		• interfacing of 8259, 8279, 8255 and 8251.
		• Microcontroller 8051.
		CO2. Analyze the interfacing of peripheral devices
		CO3. Develop ALPs for performing various operations using 8086 and 8051.
		CO4. function effectively as individual and as member in a team.
14024113	**Power Systems Simulation Lab**	On successful completion of this course, the students will be able to
		CO1. Demonstrate knowledge on
		• Sequence reactances of Transformers and synchronous machines.
		• Faults on power system.
		• Operation of relays.
		CO2. Evaluate the power developed by synchronous machines.
		CO3. Simulate the power flows in a three bus power system.
		CO4. function effectively as individual and as member in a team.
		On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• different types of electric drives.
		• methods of electric heating, welding and illumination.
		• control of traction motors

14024201	**Utilization of Electrical Power**	• mechanics of traction system
		CO2. analyze
		• appropriate drive for the industrial purpose.
		• proper illumination strategy for good lighting system.
		• the traction system for better performance
		CO3. design illumination system for proper lighting.
		CO4. demonstrate skills in evaluating the illumination levels, performance of various electrical drives and traction effort.
		CO5. apply suitable drive, heating, welding and illumination techniques for various purpose
14024202	**Power System Operation & Control**	On successful completion of this course, a student will be able to
		CO1. demonstrate knowledge on
		• characteristics of thermal and hydro units
		• optimal operation and unit commitment of thermal units.
		• scheduling of hydrothermal power plants.
		• modeling of power system components for LFC studies.
		• load frequency control of single area and two area systems.
		CO2. analyze
		• the economic operation criteria for thermal and hydrothermal units with and without losses.
		• unit commitment of thermal units.
		• LFC parameters in single and two area power system.
		• Power Factor correction and Reactive Power Compensation
		CO3. design suitable controllers to improve LFC dynamics in a single area and two area power system.
		CO4. Acquire skills in
		• economic scheduling of thermal and hydrothermal units for optimal operation and minimizing fuel cost.
		• planning of generators operating schedule using unit commitment methods.

		• evaluating the steady state frequency deviations for a load disturbance in single and two area power system.
14024203	**Electrical Distribution Systems**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• distribution system and its configurations.
		• importance of power factor and methods to improve power factor.
		• different types of loads and distribution feeders.
		• voltage drop and power loss calculation in lines
		• protection and coordination in distribution system.
		CO2. Analyze
		• different feeder configurations
		• bus bar arrangements in substations
		• optimal capacitor placement.
		• the criteria for economical power factor.
		CO3. Design proper rating of capacitor to improve power factor.
		CO4. evaluate
		• load parameters of different types of loads.
		• voltage drop, losses and fault currents in distribution system.
14024204	**Energy Auditing and Demand Side Management**	On successful completion of the course, student will be able to
		CO1. Demonstrate knowledge on
		• energy auditing practices, energy conservation schemes
		• energy indices, graphical representations
		• energy management concepts
		• characteristics of energy efficient motors, good lighting
		CO2. analyze
		• various energy instruments such as wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers.
		• payback analysis, depreciation, taxes and tax credit.
		CO3. demonstrate skills in design for good lighting system
		CO4. familiarize demand side management practices
14024205	**Switch Mode Power**	The students will have
		CO1. Ability to analyze and design switched mode power converters

14024203	**Converters**	CO2. Proper understanding about soft switching and its applications
		CO3. Deep knowledge in pulse width modulated techniques
14024206	**Electrical Machine Design**	On successful completion of seminar work, the student will be able to
		CO1. Demonstrate the knowledge on various design specifications of Electrical Machines.
		CO2. Estimate the design specifications of DC machines, Transformers, Induction machines and synchronous machines.
		CO3. Analyze the choice between various parameters like type of windings, no.poles, no.of slots etc.
		CO4. Anlyze the heating and cooling of electrical machines.
14024207	**Seminar**	On successful completion of seminar work, the student will be able to
		CO1. Demonstrate in-depth knowledge on the seminar topic.
		CO2. Analyze critically, chosen seminar topic for substantiated conclusions.
		CO3. Undertake investigation of issues related to seminar topic providing valid conclusions.
		CO4. Function effectively as individual on the chosen seminar topic.
		CO5. Develop communication skills, both oral and written for preparing and presenting seminar report.
		CO6. engage in lifelong learning to improve knowledge and competence in the chosen field of seminar.
		On completion of project work, the student will be able to
		CO1. Demonstrate in-depth knowledge on the project topic.
		CO2. identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.
		CO3. Design solutions to the chosen project problem.
		CO4. Undertake investigation of project problem to provide valid conclusions.
		CO5. Use the appropriate techniques, resources and modern engineering tools necessary for project work.

14024208	**Project Work**	CO6. Understand professional and ethical responsibilities while executing the project work.
		CO7. Function effectively as individual and a member in the project team.
		CO8. Develop communication skills, both oral and written for preparing and presenting project report.
		CO9. Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.
		CO10. engage in lifelong learning to improve knowledge and competence in the chosen area of the project.