**LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY**
Accredited by NBA & NAAC with 'A' Grade
(Approved by A.I.C.T.E & Affiliated to JNTU, Kakinada)
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# Department of Electrical and Electronics Engineering

## COURSE OUTCOMES

## Academic Year: 2017-18

| I-Year I-Semester (R16) | |
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| **Subject Name** | **Course Outcomes** |
| English – I | 1. Acquire listening, speaking, reading and writing skills necessary for the survival in the post modern society through task-based and skill-based communication practices with judicious integration of modern tools.<br>2. Realise the technical communicative competence and attainment of group dynamism and problem solving skills through standard oral and written language models.<br>3. Develop the fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.<br>4. Imbibe lifelong reading habit among the learners to grow both professionally and socially with ethical principles and values.<br>5. Apply own ideas as informed opinions that are in dialogue with a larger community of interpreters, and understand how their own approach compares to the variety of critical and theoretical approaches.<br>6. Demonstrate the intercultural competence, knowledge of civic responsibility, and able to engage effectively in regional, national, and global communities. |
| Mathematics-1 | 1. Solve the physical, geometrical and simple electrical problems using methods of first order differential equations.<br>2. Solve the electrical circuits using the methods of higher order linear differential equations.<br>3. Apply the knowledge of Laplace and Inverse Laplace transform to solve an initial value problem of differential equation.<br>4. Understand the concepts of partial differentiation, total derivative, Jacobian and methods to find the Maxima and Minima of function of several variables.<br>5. Solve first order linear and non-linear partial differential equations.<br>6. Solve higher order homogeneous and non-homogeneous partial differential equations. |
| Applied Chemistry | 1. Apply the basic knowledge of polymer chemistry an engineer design &develop FRP, Biodegradable polymer. Identify and |

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| | analyze the problems of plastics used in household appliance.<br>2. Analyse the problems associated with solid, liquid & gaseous fuels using the basic knowledge of Fuel technology.<br>3. Apply the basic knowledge of galvanic cell an engineer design different types of battery cells & Analyse the problems associated with metals using the basic principles of corrosion.<br>4. Design the Nanomaterial's like CNT using the basic knowledge of advanced engineering materials.<br>5. Apply the basic knowledge of solid state chemistry an engineer analyse the properties of conductors, superconductors, and semiconductors.<br>6. Apply the basic knowledge of non-conventional sources of energy an engineer generate power from different sources. |
| Engineering Mechanics | 1. To find the resultant of any number of forces and can apply friction concept for a given body.<br>2. To draw free body diagram for a given body can calculate the forces in members of the truss.<br>3. To find the centroid and centre of gravity of composite sections.<br>4. To evaluate and find the moment of inertia of composite sections.<br>5. To analyze the motion of the bodies and the forces causing the motion.<br>6. To apply Work-Energy and Impulse-Momentum equations to find out the different parameters. |
| Computer Programming | 1. Understand the basic terminology and data types used in computer programming and compile and debug programs in C language.<br>2. Analyze and understand the knowledge to write the programs in style and Learn different Libraries<br>3. Design programs involving decision structures, loops<br>4. Explore the knowledge on functions, Storage classes and difference between call by value and call by reference and recursion<br>5. Understand and how to organize the arrays and strings.<br>6. To get the knowledge on dynamic memory Allocations by the use of pointers. Use different data structures and create/update and basic data files. |
| Environmental Studies | 1. Understand the environment, components, structure, functions of the environment and ecosystem<br>2. Understands about the natural resources and environmental impacts and which kind of methods are to be applied for the sustainable development.<br>3. Understand the biodiversity of India and identifies its threats. Apply the knowledge about the conservation practices to protect the biodiversity.<br>4. Acquire knowledge on environmental pollution and their effects on biotic and a biotic components and control measures of pollution.<br>5. Identify social issues both rural and urban environment and the possible means to apply the environmental legislations of India towards sustainable development |

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| | 6. Acquire the knowledge on environmental assessment and stages involved in EIA and environmental audit for the self-sustaining and eco-friendly green campus |
| English Language Communication Skills Lab-I | 1. Enable students to use Computer assisted Language Laboratory (CALL) to enhance their pronunciation through stress, intonation and rhythm for routine and spontaneous interaction<br>2. Attain communicative competence for the fulfilment of academic, professional and social purposes.<br>3. Attain the language Proficiency through Contextualized, Task Based Activities to realize employment potential at the end of the course.<br>4. Acquire listening, speaking, reading and writing skills necessary for the survival in the post modern society through task-based and skill-based communication practices with judicious integration of modern tools.<br>5. Develop the fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.<br>6. Realise the technical communicative competence and attainment of group dynamism and problem solving skills through standard oral and written language models. |
| Applied/Engineering Chemistry Lab | 1. Identify the working principles of acid-base, redox, complex metric, conductometric, potentiometric titrations.<br>2. Apply the working principles of acid-base, redox, complexometric, conductometric, potentiometric titrations to perform the experiments using required apparatus.<br>3. Compute the required parameter by suitable formula using experimental values (observed values) of acid-base, redox, complex metric, conductometric, potentiometric titrations.<br>4. Analyze the experimental results through percentage of error.<br>5. Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory.<br>6. Demonstrate the working principles, procedures and applications in acid-base, redox, complexometric, conductometric, potentiometric titrations. |
| Computer Programming Lab | 1. Apply and practice logical ability to solve the problems. Document and present the algorithms, flowcharts and programs in form of user-manuals<br>2. Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment<br>3. Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs<br>4. Understand and apply the in-built functions and customized functions for solving the problems.<br>5. Understand and apply the pointers in memory allocation techniques<br>6. Understanding of different file concepts for dealing with variety of |

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| | applications. |
| **I-Year II-Semester(R16)** | |
| English-II | 1. Acquire listening, speaking, reading and writing skills necessary for the survival in the post modern society through task-based and skill-based communication practices with judicious integration of modern tools.<br>2. Realise the technical communicative competence and attainment of group dynamism and problem solving skills through standard oral and written language models.<br>3. Develop the fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.<br>4. Imbibe lifelong reading habit among the learners to grow both professionally and socially with ethical principles and values.<br>5. Apply own ideas as informed opinions that are in dialogue with a larger community of interpreters, and understand how their own approach compares to the variety of critical and theoretical approaches.<br>6. Demonstrate the intercultural competence, knowledge of civic responsibility, and able to engage effectively in regional, national, and global communities. |
| Mathematics-II (MM) | 1. Solve an algebraic and transcendental equation using an appropriate numerical method<br>2. Acquire knowledge of interpolation to find the interpolation polynomials/values for the given data.<br>3. Understand the concept of numerical integration and methods (Taylor's series, Picard's method, Euler's method, Modified Euler's method and Runge-Kutta method.) to obtain the numerical solution of an ordinary differential equation.<br>4. Understand the methods to expand the periodic and continuous functions/functions having points of discontinuity with period using Fourier series.<br>5. Understand the method of separation of variables on partial differential equations to solve the Wave equation, heat equation<br>6. Understand the concept of Fourier transforms of various types of functions. |
| Mathematics-III | 1. Apply the methods on system of simultaneous linear equations to find the current in an electrical circuits<br>2. Understand the concepts of Eigen values & Eigen vectors to solve free vibrations in mechanical strings, and analyze the nature of Quadratic forms.<br>3. Evaluate the volume and surface area of solids using multiple integrals with curve tracing concept.<br>4. Understand the concepts and properties of Beta & Gamma functions to evaluate improper integrals.<br>5. Understand the concepts of the gradient, divergence & curl to determine the normal, flux, scalar potential and to establish the relations between grad, div and curl. |

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| | 6. Analyze Green's, Stoke's and Gauss divergence theorems by establishing the relations between line, surface and volume integrals. |
| Applied Physics | 1. Apply the basic principles and properties of Interference to construct and understanding the working mechanism of Interferometer.<br>2. Develop the Diffractometer by the usage of basic principles and properties of diffraction of light.<br>3. Construct the Polari meter and Laser by utilizing the principles of polarization of light and characteristic properties of Laser.<br>4. Verify the velocity of EM wave in isotropic medium by studying its propagation through dielectric medium.<br>5. Identify the conductivity of solids by applying the principles of Quantum Mechanics & free electron theory.<br>6. Classify the given semiconductor materials based on the band theory of solids by studying its charge carriers through the Hall Effect. |
| Engineering Drawing | 1. Describe the construct polygons , curves and scales<br>2. Impart the significance of projection of points and lines<br>3. Understand to draw orthographic projections of lines inclined to both planes<br>4. Understand to draw the projection of planes<br>5. Understand to draw the projection of solids<br>6. Impart the visualization of 3D –objects and draw the orthographic, isometric views |
| Electrical Circuit Analysis-I | 1. Study the concepts of passive elements, types of sources and various network reduction techniques.<br>2. Understand the behavior of RLC networks for sinusoidal excitations. Concept of Power factor its importance<br>3. Study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.<br>4. Study the concept of magnetic coupled circuit their Applications in power Transmission<br>5. Understand the applications of network topology to electrical circuits.<br>6. Understand the applications of network theorems for analysis of electrical networks |
| English Language Communication Skills Lab-II | 1. Enable students to use Computer assisted Language Laboratory (CALL) to enhance their pronunciation through stress, intonation and rhythm for routine and spontaneous interaction<br>2. Attain communicative competence for the fulfillment of academic, professional and social purposes.<br>3. Attain the language Proficiency through Contextualized, Task Based Activities to realize employment potential at the end of the course.<br>4. Acquire listening, speaking, reading and writing skills necessary for the survival in the post modern society through task-based and skill-based communication practices with judicious integration of |

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| | modern tools.<br>5. Develop the fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.<br>6. Realise the technical communicative competence and attainment of group dynamism and problem solving skills through standard oral and written language models. |
| Applied/Engineering Physics Lab | 1. Identify the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics.<br>2. Apply the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics and perform the experiments using required apparatus.<br>3. Compute the required parameter by suitable formula using experimental values (observed values) in mechanics, optics, electromagnetic and electronic experiments.<br>4. Analyze the experimental results through graphical interpretation.<br>5. Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory.<br>6. Demonstrate the working principles, procedures and applications. |
| Engineering & IT Workshop | 1. Apply the basic concepts of carpentry and fitting to make different carpentry joints and different fits in a given time.<br>2. Apply the basic concepts of black smithy and house wiring to make different forged jobs, house wiring techniques used in our daily life in a given time.<br>3. Apply the basic concepts of tin smithy to make different jobs by using GI sheet in a given time.<br>4. Learn basic knowledge about usage of peripherals and assembling, dissembling process of system.<br>5. Capable in installing the OS and learn different tools and techniques utilization<br>6. Acquire to get the knowledge about MS-Office fundamentals and related tools and we learn about s/w & h/w trouble shooting. |
| **II-Year I-Semester (R16)** | |
| Electrical Circuit Analysis-II | 1. Analyze and determine three phase circuit parameters under balanced conditions<br>2. Analyze and determine three phase circuit parameters under unbalanced conditions<br>3. Understand the transient and steady state behaviour of passive elements for DC and AC excitations.<br>4. Determine and relate two port network parameters and understand stability of network functions.<br>5. Design and synthesis of complex electrical circuits.<br>6. Understand wave symmetry and harmonics, representation of a finite series into an infinite series. |
| Thermal and Hydro Prime movers | 1. Students are able to understand the working principle of IC engines.<br>2. Students are able to calculate the efficiency and performance of a steam turbine. |

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| | 3. Students are able to calculate the efficiency and performance of gas turbines.<br>4. Students are able to understand the working and construction of pumps.<br>5. Students are able to understand the working and construction hydraulic turbines.<br>**6.** Students are able to understand working principle of power plant. |
| Basic Electronics And Devices | 1. Understand the basic concepts of semiconductor physics.<br>2. Construction, operation and characteristics of PN junction diode and special diodes.<br>3. Operation of rectifiers and regulators and design of filter circuits<br>4. Acquire the knowledge about working principle of transistor& their characteristics. Concepts of biasing, stabilization and compensation techniques used in transistor circuits.<br>5. Explain the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.<br>6. Operating principles of feedback amplifiers, and importance of feedback in oscillators & amplifiers. |
| Complex Variables and Statistical Method | 1. Understand the concept of analyticity of the complex functions, C-R equations and to find the velocity potential and flux functions of flow problems using C-R equations.<br>2. Evaluation of definite integration over a closed region by using complex integration and find the series expansions of analytical functions using Taylor's, Maclaurin's and Laurent's series expansion.<br>3. Complex integrals will be evaluated using Cauchy Residue theorem and evaluation of improper integrals<br>4. Understand how to find Bilinear Transformation of different functions – fixed point – cross ratio – properties – invariance of circles<br>5. Acquire knowledge on normal distribution and apply it to find the population parameters<br>6. Student able to know the procedure for testing of hypothesis and apply it for Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test |
| Electro Magnetic Fields | 1. Able to calculate electric field and potentials using Gauss's law and solve Laplace's or Poisson's equations.<br>2. Understand the concepts of capacitance, energy stored in dielectrics and concepts of conduction and convection currents.<br>3. To find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.<br>4. Able to calculate the magnetic forces and torque produced by currents in magnetic field.<br>5. Ability to calculate self and mutual inductances and the energy stored in the magnetic field.<br>6. Acquires knowledge on time varying fields and get to calculate induced Emf and know about displacement current and Pointing vector. |

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| Electrical Machines-I | 1. Understand the concepts of electromagnetic energy conversion.<br>2. Explain the construction and operation of dc generators, , armature reaction and commutation<br>3. Study the performance characteristics of different types of dc generators.<br>4. Study the No-load, internal and external characteristics of different types of dc motors.<br>5. Design of armature resistance for starting of DC motors, different types of starters. Testing of dc motors.<br>6. Exp1ain the design aspects of a dc machine |
| Thermal and Hydro Lab | 1. By learning the concept, a student can understand the working principle of IC engine and can able to draw valve and port timing diagrams.<br>2. The student can able to study the performance and can calculate the efficiency for a multi-cylinder petrol engine.<br>3. By understanding the above concept a student can easily know about diesel engines and can calculate the performance under varying loads.<br>4. The student can able to understand the various classification of boilers and their working principles<br>5. By learning the calibration techniques student can able to understand how to control the flow of fluids in a piping system.<br>6. Student can able to evaluate performance of a pumps and turbines |
| Electrical Circuits Lab | 1. Design and analyze basic electrical circuits<br>2. Understand the simplification analogy of electrical circuits with the application of various network theorems<br>3. Study the behaviour of RLC circuits at resonant frequency<br>4. Determination of 3-ϕ power of balanced and unbalanced systems<br>5. Understand and determine two-port network parameters & choke coil parameters<br>6. Analyze various inductive circuits and determine co-efficient of coupling |
| **II Year –II Semester (R16)** | |
| Electrical Measurements | 1. Design & Analysis of the operation of various Electrical measuring instruments.<br>2. Design & working of power, energy, pf and frequency measuring devices. Calibration of energy meters.<br>3. Understand the calibration process of measuring instruments using potentiometer and measurement of resistance, voltage and current..<br>4. Apply the concepts of Ac & DC bridges for measurement of electrical parameters.<br>5. Study the construction and working of ballistic galvanometer and flux meter used for magnetic measurement.<br>6. Understand the concepts of various digital meters and application of lissajious patterns. |
| Electrical Machines-II | 1. Explain the construction, working and classification of three phase induction motor.<br>2. Determine the performance characteristics of induction motor and explain different phenomenon on the operation of induction motor |

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| | 3. Construction & Operation of Single Phase IM and their Application.<br>4. Explain the Construction & Operation of 3-Ph Alternator and different types of Armature Winding. Understand the Concepts of Voltage Regulation and Explain the Two Reaction Theory.<br>5. Explain the Operation principle of Synchronous Motor and its Analysis.<br>6. Understand the Concepts of Hunting and Methods of Starting of Synchronous Motor |
| Switching Theory and Logic Design | 1. Understand the numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.<br>2. Understand the simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions<br>3. Understand the design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.<br>4. Understand the design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits<br>5. Understand the design and analyze flip flops ,registers and counters<br>6. Understand the design and analyze state diagrams for flip flops |
| Control Systems | 1. Develop the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.<br>2. Determine the time response specifications, steady state errors and error constants of second order systems<br>3. Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.<br>4. Analyze the stability of LTI systems using frequency response methods.<br>5. Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.<br>6. Understand the concepts of Controllability, Observability and determine the response from state space models. |
| Power Systems-I | 1. Analyze and understand the generation of electrical power<br>2. Design the distribution of DC power system & AC power system<br>3. Study the operation and maintenance of Substations<br>4. Understand the concept of under Ground Cables<br>5. Understand the concept of load curves at all seasons.<br>6. Understand the concept of tariff and methods |
| Management science | 1. Analyze and evaluate management concept and its implementation in aim of achieving organizational goals.<br>2. To Equip with the concepts of operations, project management through technical relationships of input and output and inventory control<br>3. To understand the importance and vital role of human resources power in the main functional areas of organization i.e., Marketing |

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| | Management, Human Resource Management<br>4. Project handling and controlling techniques for optimum utilization of resources<br>5. Describes the concept and practical issues relating to strategic management and its role in long-term decision making<br>6. Apply modern management techniques MIS, MRP, JIT and ERP etc to meet global challenges in effective manner |
| Electrical Machines -I Lab | 1. Determination of Performance characteristics of DC Shunt and DC series generators.<br>2. Assess the efficiency of DC shunt motors with and without loads.<br>3. Understands various speed control methods of DC machines<br>4. Determine the Efficiency & Regulation of Transformers and draw their Performance curves.<br>5. Analyze 3-phase to 2-phase conversion by means of Scott connection.<br>6. Analyze the Parallel operation of 1- Φ transformer. |
| Electronic Devices & Circuits Lab | 1. Understand the design, working and operation of different electronic and power devices.<br>2. Study the working and characteristics of different electronic devices.<br>3. Study the working and characteristics of different power devices.<br>4. Design and analysis of amplifiers using different transistor configurations with different biasing techniques.<br>5. Design and study the operation of the diode rectifier's with and without filter.<br>6. Study the operation of different oscillator's |
| **III Year –I Semester (R13)** | |
| Managerial Economics and Financial Analysis | 1. Analyze macro, micro economic concepts useful for business units and determine influences of demand and supply analysis<br>2. Specifications of production functions , types of costs and solving engineering problems by applying knowledge of economics<br>3. Equipped with the consciousness about market structures and pricing methods of industries<br>4. Create awareness to start an enterprise in their own and identification of different stages of business cycle<br>5. Knowledge of preparation of accounts, financial statements and their analysis through ratios etc.,<br>6. Significant value with financing methods, their applicability in decision making and problem-solving skills according to new trends. |
| Electrical Measurements | 1. Design and analysis of the operation of various Electrical measuring instruments.<br>2. Design and working of power, energy, pf and frequency measuring devices. Calibration of energy meters.<br>3. Understand the calibration process of measuring instruments using potentiometer and measurement of resistance, voltage and current.<br>4. Apply the concepts of Ac & DC bridges for measurement of electrical parameters.<br>5. Study the construction and working of ballistic galvanometer and |

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| | flux meter used for magnetic measurement.<br>6. Understand the concepts of various digital meters and application of lissajious patterns. |
| Power Systems-II | 1. Computation of inductance and capacitance of transmission lines using the concepts of GMD, GMR.<br>2. Classify & representation of transmission lines, and determination of their performance characteristics.<br>3. Study the performance and modeling of long transmission lines.<br>4. Understand the transient behavior of transmission lines.<br>5. Study the factors affecting the performance of transmission lines and power factor improvement methods.<br>6. Design of sag and tension of transmission lines. Overhead insulators and their application. |
| Electrical Machines-III | 1. Construction & Operation of Single Phase IM and their Application.<br>2. Explain the Construction & Operation of 3-Ph Alternator and different types of Armature Winding<br>3. Understand the Concepts of Voltage Regulation and Explain the Two Reaction Theory.<br>4. State Necessary & Sufficient Condition for Parallel operation and Explain the Concept of Load Sharing<br>5. Explain the Operation principle of Synchronous Motor and its Analysis.<br>6. Understand the Concepts of Hunting and Methods of Starting of Synchronous Motor |
| Power Electronics | 1. Explain the characteristics of various power semiconductor devices and analyze the operation of diode bridge rectifier<br>2. Design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers<br>3. Explain the operation of single phase full–wave converters and analyze harmonics in the input current.<br>4. Explain the operation of three phase full–wave converters and dual Converter<br>5. Analyze the operation of single phase cyclo converters and high frequency dc–dc converters<br>6. Explain the working of inverters and application of PWM techniques for voltage control and harmonic mitigation |
| Linear & Digital IC Applications | 1. Understanding the basic concepts of Differential Amplifiers and operational amplifiers Architecture.<br>2. Understanding the concepts relevant to various Op-Amp parameters and voltage rectifier circuits.<br>3. Examine the Design of Op-Amp circuits suitable for various Linear and Non-Linear Applications.<br>4. Analyze the design of active filters, analog multipliers and Modulators using Op-amps.<br>5. Utilize the architecture and working of 555 Timer for use in various applications.<br>6. Outline the different architecture of different digital to analog and |

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| | analog to digital converters. |
| Electrical Machines-II Lab | 1. Determine the Efficiency & Regulation of Transformers and draw their Performance curves<br>2. Student can understand the concepts of Scott Connection Of Transformers<br>3. Pre-determine the Regulation of Three Phase Alternator by Various Methods, Find X d / Xq Ratio of Alternator and asses the performance of Three Phase Synchronous Motor.<br>4. perform Various Tests in Induction Motor for assessing its performance characteristics<br>5. Perform Synchronization Of Alternator By Dark Lamp Method |
| Control Systems Lab | 1. Time Response Analysis of Second Order Systems<br>2. Characteristics of Synchro's, AC & DC Motors and Magnetic Amplifiers<br>3. Effect of P,PI & PID controllers on Second Order Systems<br>4. Temperature Controller using PID, Lead and Lag Compensators and Effect of Feedback on DC Shunt Motor<br>5. Transfer Function of DC motor |
| IPR & Patents | 1. Knowledge on basic concepts of Intellectual Property , Innovations and Inventions of Intellectual Property Law<br>2. Evaluate the principles and rights afforded by Copyright, its infringement and International Copyright Law .<br>3. Analyze Patent registration requirements, infringement and Litigation, new developments and international laws<br>4. Registration Process of Trade Marks, Inter-parties proceedings, litigations , claims and global factors related to trade marks<br>5. Conceptual awareness about trade Secrets, Employee Confidentiality Agreement, Trade Secret Litigation and breach of law<br>6. Elucidate Cyber Law and Cyber Crimes , E-commerce, International aspects of Computer and Online Crime |
| **III Year – II Semester (R13)** | |
| Switchgear and Protection | 1. Analyze the principles of arc interruption. Working principles of high voltage circuit breakers, their applications and comparison<br>2. Understand the working principle and constructional features of different types of electromagnetic protective relays<br>3. Acquire knowledge of various faults that occur in high power generators, transformers and their respective protective schemes<br>4. Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.<br>5. Understand the working principle and constructional features of different types of Static Relays.<br>6. Study the protection against over voltages and different grounding methods |
| Microprocessors & Microcontrollers | 1. Illustrate the internal architecture and working of various features of 8086 microprocessor and its successors 80286, 80386, 80486, Pentium.<br>2. Extend the 8086 functions with various operating modes, |

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| | instruction set and addressing modes.<br>3. Identify assembler directives and apply the assembly language programming to solve different problems.<br>4. Outline various peripheral control ICs such as 8255, 8279, 8257 and 8259 and also write programs to develop different applications using them.<br>5. Illustrate the architecture, memory, timer, serial communication, controlling functions of 8051 microcontroller.<br>6. Develop assembly language programs of 8051 microcontroller to control push button, LED, hex keypad, relay and latches commonly used in real world applications. |
| Utilization of Electrical Energy | 1. Identify a suitable motor for electric drives and industrial Applications.<br>2. Identify most appropriate heating or welding techniques for suitable applications.<br>3. Understand various level of luminosity produced by different illuminating sources.<br>4. Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting.<br>5. Determine the speed/time characteristics of different types of traction motors.<br>6. Estimate energy consumption levels at various modes of operation. |
| Power System Analysis | 1. Application of Graph theory. Representation of reactance diagram and formation of YBUS<br>2. Application of numerical methods for the power flow studies<br>3. Formation of ZBUS and algorithm for ZBUS modifications<br>4. Analysis of symmetrical fault analysis<br>5. Understand the concept of symmetrical component theory and its application for unsymmetrical fault analysis<br>6. Define stability and explain the various methods to improve stability of the power system |
| Power Semiconductor Drives | 1. Understand the fundamentals of electric drive and different electric braking methods.<br>2. Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.<br>3. Understand and analyze the converter control of dc motors in four quadrants.<br>4. Understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.<br>5. Understand the principles of static rotor resistance control and various slip power recovery schemes.<br>6. Understand the speed control mechanism of synchronous motors |
| Management Science | 1. Analyze and evaluate management concept and its implementation in aim of achieving organizational goals.<br>2. To Equip with the concepts of operations, project management through technical relationships of input and output and inventory |

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| | control<br>3. To understand the importance and vital role of human resources power in the main functional areas of organization i.e., Marketing Management, Human Resource Management<br>4. Project handling and controlling techniques for optimum utilization of resources<br>5. Describes the concept and practical issues relating to strategic management and its role in long-term decision making<br>6. Apply modern management techniques MIS, MRP, JIT and ERP etc to meet global challenges in effective manner |
| Power Electronics Lab | 1. Design and development of Power electronic based hardware circuits<br>2. Study the characteristics of various solid state devices<br>3. Study of Power conversion from AC to DC and vice versa using appropriate converter circuits (Single phase and Three phase)<br>4. Understand the operation of various power electronic circuits for variable voltages in both AC and DC circuits.<br>5. Understand the operation of various power electronic circuits for variable frequencies.<br>6. Application of Power electronic converters for four quadrant operation of DC machines |
| Electrical Measurements Lab | 1. Understand the concepts of measurements of electrical quantities and calibration of different electrical measuring instruments.<br>2. Determination of 3-phase power of balanced loads using wattmeters and CT'S.<br>3. Testing and calibration of various electrical quantity measuring instruments.<br>4. Measurement of the basic elements (R, L & C) in electrical circuits using different AC & DC Bridges.<br>5. Study the three voltmeter and 3 ammeter concept to measure various parameters of electrical circuits. |
| **IV Year – I Semester (R13)** | |
| Renewable Energy Sources and Systems | 1. Understand the basic concepts of solar radiation, its data on earth's surface.<br>2. Study and design of different types of solar energy collectors<br>3. Study, design and selection of direct solar energy conversion system<br>4. Study and design of Wind energy conversion systems<br>5. Study the concepts of water energy to electrical conversion systems<br>6. Understand the methods of generation of electricity from chemical and geothermal resources |
| HVAC & DC Transmission | 1. Acquaint with HV transmission system with regard to power handling capacity, losses, conductor resistance and electrostatic field associated with HV. Further knowledge is gained in area of bundle conductor system to improve electrical and mechanical performance.<br>2. Determination of corona, radio interference, audible noise |

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| | generation and frequency spectrum for single and three phase transmission lines.<br>3. Acquire knowledge in transmission of HVDC power with regard to terminal equipment's, type of HVDC connectivity and planning of HVDC system.<br>4. Develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.<br>5. Understand the concepts of reactive power requirements of conventional control, filters and reactive power compensation in AC side of HVDC system<br>6. Calculate voltage and current harmonics, and design of filters for 6 and 12 pulse conversion |
| Power System Operation & Control | 1. Compute optimal scheduling of Generators.<br>2. Study and understand the Optimal scheduling of hydrothermal systems<br>3. Computation of Cost function formulation and understand the unit commitment problem.<br>4. Modeling of Turbine Generator sets and understand role of the frequency.<br>5. Significance of Economic dispatch control and load frequency control in single area and two area systems<br>6. Design of reactive power control and line power compensation in transmission systems |
| Instrumentation | 1. Represent of various types of signals and their performance characteristics<br>2. Classification and operation of different types of transducers<br>3. Measurement of different types of Non–electrical quantities.<br>4. Understand the construction and working principle of various types of digital voltmeters<br>5. Block diagram representation and operation of CRO, measurement of different parameters (phase and frequency) of a signal.<br>6. Study the concepts of different types of signal analyzers |
| Electrical Distribution system | 1. Explain the various factors of distribution system and understand the planning of distribution system<br>2. Design the substations and understand the need of feeder voltage levels.<br>3. Determine the voltage drop and power loss for different load areas.<br>4. Analyze and Compare the various protection schemes and its coordination Procedure.<br>5. Understand the effect of compensation on P.F improvement<br>6. Analyze various voltage control methods |
| Microprocessors & Microcontrollers Lab | 1. Develop Assembly language programs to demonstrate the arithmetic operations of binary, BCD, ASCII and Boolean logical operations.<br>2. Examine different string based operations in assembly language such as moving string, finding length of string, reverse of string, insertion, deletion, sorting. |

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| | 3. Make use of standard DOS functions in assembly language to display message on screen, reading keys from keyboard with and without echo.<br>4. Experiment with different peripheral control ICs, 8259 interrupt control, 8279 keyboard/display control, 8255 peripheral program interface to build traffic lights control and stepper motor control.<br>5. Develop assembly language programs to make use of parallel ports, timers and serial port of 8051 microcontroller. |
| Electrical Simulation Lab | 1. Analyze and study the PSPICE & MATLAB simulations in application to electrical systems.<br>2. Design and analyze the behavior of RLC electrical circuits with different inputs.<br>3. Understand and simulate the significant power system aspects like, Transmission line simulation, Transformer modeling, Load flow studies and Load frequency control.<br>4. Design and simulate various electronic circuits.<br>5. Understand the Modeling and Stability analysis of different electrical systems by Transfer function approach. |
| Power systems Lab | 1. Determine the sequence impedance of Alternator and Transformer.<br>2. Determine the transmission line parameters and study the Ferranti Effect.<br>3. Estimate the dielectric breakdown voltage of liquid insulations.<br>4. Study the operation and calibrate tong tester.<br>5. Design and simulation of load frequency controllers, stability analysis and load flow studies of power system network. |
| **IV Year – II Semester (R13)** | |
| Digital Control Systems | 1. Able to learn the advantages of discrete time control systems and the “know how” of various associated accessories.<br>2. Understand the concepts of z–transformations and their role in the mathematical analysis of different systems. (Like Laplace transforms in analog systems).<br>3. Ability to understand about State Space Representation of discrete time systems and test Controllability and Observability.<br>4. Acquire the knowledge to understand stability criterion for digital systems and methods adopted for testing the same are explained.<br>5. Capable to design discrete time control system by conventional methods for Lead, Lag and Lead-Lag compensators and digital PID controllers.<br>6. Design of state feedback controller through pole placement. |
| Extra High Voltage Transmission | 1. Ability to deriving the equations for electric stress enhancement in high voltage insulation defects.<br>2. Deriving the equations for charge movement during the breakdown process in gases, liquids and solids. Explaining the physical process of breakdown - based on the Townsend, Streamer and Leader models.<br>3. Understand the basic generation and measurement of High voltage and High current for testing purpose.<br>4. Understand the Measurement of D.C Resistivity, Measurement of |

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| | Dielectric Constant and loss factor, Partial discharge measurements<br>5. Test high voltage electrical Equipment with various testing devices defining the standard test waveforms for selected HV tests. Deriving the performance equations for certain HV measurement systems (from dc through to systems to measure VFTs), and design these systems. Critically evaluating technical papers describing work in the field of HV engineering.<br>6. Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements |
| Special Electrical Machines | 1. Understand the operation, design and control of switched reluctance motor.<br>2. Study the operation, performance and different control of stepper motors.<br>3. Acquire knowledge about the construction, operation and characteristics of permanent magnet DC motor.<br>4. Understand the operation of brushless DC motor<br>5. Explain the construction, operation and applications of linear induction motors.<br>6. Signify the various electrical motors applicable for traction drives. |
| Electrical Power Quality | 1. Differentiate between different types of power quality problems.<br>2. Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power System.<br>3. Explain the principle of voltage regulation and power factor Improvement methods.<br>4. Analyze the effects of Harmonic Distortion & their solutions.<br>5. Demonstrate the relationship between distributed generation and power quality.<br>6. Explain the power quality monitoring concepts and the usage of measuring instruments. |
| Flexible AC Transmission System | 1. Understand the concept of power flow control in transmission lines using FACTS controllers.9<br>2. Acquire knowledge on operation and control of voltage source converter.<br>3. Explain compensation methods to improve stability and reduce power oscillations in the transmission lines.<br>4. Application of static VAR compensators for shunt compensation.<br>5. Appreciate the methods of compensations by using series compensators.<br>6. Explain the operation of modern power electronic controllers |
| UNIX and Shell Programming | 1. Understand internal structure of Unix and its features<br>2. Use UNIX editors and tools to create and modify data files and documents.<br>3. Use UNIX at the command line to create and manage data, files, and programs.<br>4. Use UNIX shells and commands to create powerful data processing applications. |

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| | 5. Develop shell scripts in order to perform basic shell programming<br>6. Build UNIX applications using the shell command interpreter and UNIX commands. |
| Power systems Reforms | 1. Understand the concepts of the restructuring models, independent system operator, congestion pricing and market power<br>2. Understand the structure of OASIS, definitions of transfer capability issues and methodologies to calculate ATC<br>3. Understand the concept of the introduction to congestion management and methods to relieve congestion<br>4. Understand the introduction to electricity price volatility, construction of forward price curves and challenges to electricity pricing<br>5. Able to develop the operational planning activities of ISO, the ISO in bilateral markets and operational planning activities of Genco.<br>6. Acquires knowledge on reactive power as an ancillary service and a review of synchronous generators as ancillary service providers. |
| Project | 1. Apply the concepts of electrical engineering to analyze the ideas students and design the physical/simulation model.<br>2. Enable students to work as an individual in a team inculcating leadership, management and financial oriented skills<br>3. Identify state of the art in the fields of electrical engineering through literature survey and implement the ideas using modern tools while enabling lifelong learning.<br>4. Design and develop models that are useful for the society/environment by following research ethics and values.<br>5. Improve writing and presentation skills of students so as to enable the work done by them to get published. |

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