LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A)
Accredited by NBA & NAAC with 'A' Grade
(Approved by A.I.C.T.E & Affiliated to JNTU, Kakinada)
Jonnada (Village), Denkada (Mandal), Vizinagaram Dist. – 535 005
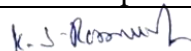Phone No. 08922-241111, 241112
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Department of Electrical and Electronics Engineering

COURSE OUTCOMES
Academic Year: 2019-20

I-Year I-Semester (R19)	
Subject Name	**Course Outcomes**
Linear Algebra and Ordinary Differential Equations (R19BSH-MA1102)	1. Apply the matrix algebra techniques to engineering applications. (L3) 2. Apply the concepts of Eigen values and Eigen vectors to free vibration of a two mass systems. (L3) 3. Apply mean value theorems to real world problems.(L3) 4. Solve the first order ordinary differential equations related to various engineering fields. (L3) 5. Solve the higher order differential equations and analyze physical situations. (L3)
English (R19BSH- EN1101)	1. Understand the value of Human Conduct for career development through life skills: Ethics & Values and use root words and Prepositions without errors. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading 2. Observe the significance of imagery in poetry to use it in real-time contexts and learn to use and misuse of Articles, Prefixes, Suffixes, and Punctuations. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading 3. Acquire conversation skills through drama and enhance the correct use of Nouns, Pronouns, Verbs and Concord to write paragraphs effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading 4. Develop reading for inspiration, interpretation & innovation and learn to use modifiers, synonyms and antonyms to write essays effectively. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading 5. Learn meaningful use of language by avoiding meaningless clichés, bureaucratic euphemisms and academic jargon in order to acquire the skill of summarising. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading
Engineering Chemistry (R19BSH- CH1101)	1. Distinguish thermoplastics, thermosetting plastics and elastomers. (L4) 2. Design the metallic materials to prevent the corrosion. (L6) 3. Discuss the working principle and applications of primary,

	secondary battery cells, fuel cells and Photo Voltaic Cell. (L6)
	4. Compare the working principle and materials used in Floppy, CD and pen drive. (L4)
	5. Illustrate the preparation, properties and applications of Nano materials and importance of green chemistry. (L2)
Problem Solving and Programming using C (R19CSE-ES1101)	1. Develop algorithms and flowcharts and also Understand the compilation, debugging, execution and writing of basic C programs
	2. Develop C Programs using control and iterative statements
	3. Develop C programs using Arrays and functions
	4. Apply the knowledge of strings and pointers in programming
	5. Comprehend file handling and user defined data types
Communicative English Lab-I (R19BSH-EN1102)	1. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively.
	2. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely.
	3. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates
	4. acquire effective strategies for good writing and demonstrate the same in summarizing and reporting
	5. Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations.
Engineering Chemistry Lab (R19BSH- CH1102)	1. Explain the functioning of the instruments such as pH, Viscometer, Conductivity and Potentiometric meters.
	2. Determine the concentrations of Acid, Zinc, Iron and Copper
	3. Compare viscosities of different oils.
	4. Prepare polymers and nano materials.
	5. Identify the safety precautions to carry out the experiments in the laboratory using chemicals.
Problem Solving and Programming using C Lab (R19CSE-ES1102)	1. Learn Basic computer Installations and Office Tools, Document and present the algorithms, flowcharts and programs in form of user-manual and also apply and practice logical ability to solve the problems.
	2. Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
	3. Analyzing the complexity of problems modularize the problems into small modules and then convert them into programs
	4. Understand and apply the in-built functions and customized functions for solving the problems.
	5. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
Electrical Engineering Workshop (R19EEE-ES1103)	1. Explain the limitations, tolerances, Safety aspects of electrical systems and wiring. (L2)
	2. Select wires/cables and other accessories used in different types of wiring. (L3)
	3. Make simple lighting and power circuits. (L3)
	4. Measure current, voltage and power in a circuit. (L3)
	5. Apply starting methods to AC and DC Machines.(L3)

Environmental Science (R19BSH-MC1101)	1. Understand about the environment and natural resources. 2. Illustrate about the ecosystem and knows the importance of conservation of biodiversity. 3. Understands about various attributes of different types of pollution and their impacts on the environment and control methods along with waste management practices. 4. Relate the current environmental impacts with the societal problems. 5. Identify the current population growth with their impacts and apply the knowledge how to manage environment issues.

I-Year II-Semester (R19)

Transform Techniques and Partial Differential Equations (R19BSH-MA1206)	1. Apply the Laplace transform for solving differential equations and integral equations. (L3) 2. Apply partial differentiation to find maxima and minima of functions of several variables. (L3) 3. Find the Fourier series expansions of various functions and apply integral expressions for the forward and inverse Fourier transform. (L3) 4. Solve partial differential equations of first and higher order using analytical methods. (L2) 5. Develop Z transform techniques to solve discrete time systems. (L3)
Numerical Methods and Multivariable Calculus (R19BSH-MA1204)	1. Solve non-linear equations using various numerical methods. (L2) 2. Apply numerical methods to find interpolation polynomial for a given data and solutions of ordinary differential equations. (L3) 3. Evaluate the volume and surface area of solids using multiple integrals. (L3) 4. Understand the physical meaning of different operators such as gradient, curl and divergence. (L3) 5. Estimate the work done against a field, circulation and flux using vector integral theorems. (L3)
Thermal and Hydro Prime Movers (R19MEC-PC1202)	1. Understand the basic working principle for IC engines(L2) 2. Understand the basic Airstandard cycles.(L2) 3. Understand the basic concept gas turbine and cycles(L2) 4. Explain the basic principle of jet and pumps(L2) 5. Analyse different loads on turbine of hydro electric power plant(L4)
Applied Physics (R19BSH-PH1201)	1. Interpret the interaction of optic energy with matter(L2) 2. Explain the properties of polarization and Lasers(L2) 3. Classify the given dielectric and semiconductor materials (L3) 4. Analyze Electromagnetic wave propagation in non-conducting medium(L3) 5. Apply the principles of nano materials and digital electronics to electrical engineering(L3)
Electrical Circuit Analysis – I (R19EEE-ES1203)	1. Understands V-I relationships of basic circuit elements and network reduction techniques. (L2) 2. Determine of co-efficient of coupling for a given magnetic circuit. (L5) 3. Analyzes single phase ac circuits and understands concepts of

	phase and power factor. (L4)
	4. Extends knowledge of dc analysis to ac circuits and determines selectivity of a RLC resonant circuit. (L2)
	5. Simplify complex electrical networks by using various network theorems. (L4)
Applied Physics Laboratory (R19BSH-PH1204)	1. Apply the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics and perform the experiments using required apparatus. (L3)
	2. Compute the required parameter by suitable formula using experimental values (observed values) in mechanics, optics, electromagnetic and electronic experiments. (L3)
	3. Analyze the experimental results through graphical interpretation. (L4)
	4. Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory. (L2)
	5. Demonstrate the working principles, procedures and applications. (L3)
Communicative English Lab-II (R19BSH-EN1201)	1. Enabling students to use Computer assisted Language Laboratory (CALL) to enhance their pronunciation through stress, intonation and rhythm for routine and spontaneous interaction
	2. Attainment of communicative competence for the fulfilment of academic, professional and social purposes.
	3. Attainment of language Proficiency through Contextualized, Task Based Activities to realize employment potential at the end of the course.
	4. Acquired 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.
	5. Development of fluency and accuracy for effective and professional communication in real-time situations by using appropriate verbiage and contextual knowledge.
Engineering Drawing (R19MEC-ES1201)	1. Apply the basics of engineering drawing to construct the polygons and curves. (L3)
	2. Draw the orthographic projections of points and lines. (L3)
	3. Draw the projections of planes in various conditions. (L3)
	4. Draw the projections of regular solids inclined to one of the planes. (L3)
	5. Imagine the isometric views of orthographic views and vice versa. (L6)
Engineering Workshop & IT Workshop (R19MEC-ES1205)	1. Apply wood working skills in real world applications. (L3)
	2. Build different parts with fitting in engineering applications. (L3)
	3. Apply forging operations for different black smith applications. (L3)
	4. Understand the basic components, peripherals and basic operations a computer. (L3)
	5. Get hands on experience in trouble shooting a system? (L5)
Constitution of India (R19BSH-MC1201)	1. Impart knowledge on historical background of the constitution making and its importance for building a democratic India.(L2)
	2. Analyze the functioning of three wings of the government ie.,

	executive, legislative and judiciary.(L2)
	3. Explain the value of the fundamental rights and duties for becoming good citizen of India.(L2)
	4. Analyze the decentralization of power between central, state and local self-government.(L4)
	5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.(L3)

II-Year I-Semester (R16)

Electrical Circuit Analysis-II	1. Analyze and determine three phase circuit parameters under balanced conditions
	2. Analyze and determine three phase circuit parameters under unbalanced conditions
	3. Understand the transient and steady state behavior of passive elements for DC and AC excitations.
	4. Determine and relate two port network parameters and understand stability of network functions.
	5. Design and synthesis of complex electrical circuits.
	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.
	2. Students are able to calculate the efficiency and performance of a steam turbine.
	3. Students are able to calculate the efficiency and performance of gas turbines.
	4. Students are able to understand the working and construction of pumps.
	5. Students are able to understand the working and construction hydraulic turbines.
	6. Students are able to understand working principle of power plant.
Basic Electronics And Devices	1. Understand the basic concepts of semiconductor physics.
	2. Construction, operation and characteristics of PN junction diode and special diodes.
	3. Operation of rectifiers and regulators and design of filter circuits
	4. Acquire the knowledge about working principle of transistor& their characteristics. Concepts of biasing, stabilization and compensation techniques used in transistor circuits.
	5. Explain the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.
	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.
	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.
	3. Complex integrals will be evaluated using Cauchy Residue theorem and evaluation of improper integrals
	4. Understand how to find Bilinear Transformation of different functions – fixed point – cross ratio – properties – invariance of circles
	5. Acquire knowledge on normal distribution and apply it to find the population parameters
	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.
	2. Understand the concepts of capacitance, energy stored in dielectrics and concepts of conduction and convection currents.
	3. To find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.
	4. Able to calculate the magnetic forces and torque produced by currents in magnetic field.
	5. Ability to calculate self and mutual inductances and the energy stored in the magnetic field.
	6. Acquires knowledge on time varying fields and get to calculate induced Emf and know about displacement current and Pointing vector.
Electrical Machines-I	1. Understand the concepts of electromagnetic energy conversion.
	2. Explain the construction and operation of dc generators, , armature reaction and commutation
	3. Study the performance characteristics of different types of dc generators.
	4. Study the No-load, internal and external characteristics of different types of dc motors.
	5. Design of armature resistance for starting of DC motors, different types of starters. Testing of dc motors.
	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.
	2. The student can able to study the performance and can calculate the efficiency for a multi-cylinder petrol engine.
	3. By understanding the above concept a student can easily know about diesel engines and can calculate the performance under varying loads.
	4. The student can able to understand the various classification of boilers and their working principles
	5. By learning the calibration techniques student can able to understand how to control the flow of fluids in a piping system.
	6. Student can able to evaluate performance of a pumps and turbines

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Electrical Circuits Lab	1. Design and analyze basic electrical circuits
	2. Understand the simplification analogy of electrical circuits with the application of various network theorems
	3. Study the behavior of RLC circuits at resonant frequency
	4. Determination of 3-ϕ power of balanced and unbalanced systems
	5. Understand and determine two-port network parameters & choke coil parameters
	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.
	2. Design & working of power, energy, pf and frequency measuring devices. Calibration of energy meters.
	3. Understand the calibration process of measuring instruments using potentiometer and measurement of resistance, voltage and current..
	4. Apply the concepts of Ac & DC bridges for measurement of electrical parameters.
	5. Study the construction and working of ballistic galvanometer and flux meter used for magnetic measurement.
	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.
	2. Determine the performance characteristics of induction motor and explain different phenomenon on the operation of induction motor
	3. Construction & Operation of Single Phase IM and their Application.
	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.
	5. Explain the Operation principle of Synchronous Motor and its Analysis.
	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.
	2. Understand the simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions
	3. Understand the design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
	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

	5. Understand the design and analyze flip flops ,registers and counters
	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.
	2. Determine the time response specifications, steady state errors and error constants of second order systems
	3. Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
	4. Analyze the stability of LTI systems using frequency response methods.
	5. Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
	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
	2. Design the distribution of DC power system & AC power system
	3. Study the operation and maintenance of Substations
	4. Understand the concept of under Ground Cables
	5. Understand the concept of load curves at all seasons.
	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.
	2. To Equip with the concepts of operations, project management through technical relationships of input and output and inventory control
	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
	4. Project handling and controlling techniques for optimum utilization of resources
	5. Describes the concept and practical issues relating to strategic management and its role in long-term decision making
	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.
	2. Assess the efficiency of DC shunt motors with and without loads.
	3. Understands various speed control methods of DC machines
	4. Determine the Efficiency & Regulation of Transformers and draw their Performance curves.
	5. Analyze 3-phase to 2-phase conversion by means of Scott connection.
	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.
	2. Study the working and characteristics of different electronic devices.

	3. Study the working and characteristics of different power devices. 4. Design and analysis of amplifiers using different transistor configurations with different biasing techniques. 5. Design and study the operation of the diode rectifier's with and without filter. 6. Study the operation of different oscillator's
III Year - I Semester (R16)	
Power Systems-II	1. Computation of inductance and capacitance of transmission lines using the concepts of GMD, GMR. 2. Classification & representation of transmission lines, and determination of their performance characteristics. 3. Study the performance and modelling of long transmission lines. 4. Understand the transient behaviour of transmission lines. 5. Study the factors affecting the performance of transmission lines and power factor improvement methods. 6. Design of sag and tension of transmission lines. Overhead insulators and their application.
Renewable Energy Sources	1. Understand the basic concepts of solar radiation, its data on earth's surface. 2. Design different types of solar thermal energy collectors 3. Design and selection of direct solar energy conversion system 4. Understand the Wind energy conversion systems 5. Explain concepts of water energy to electrical conversion systems. 6. Understand the methods of generation of electricity from chemical and geothermal resources
Signals and Systems	1. Classify signals and systems and justify the orthogonality of signals. 2. Apply the Fourier series and Fourier transform on continuous-time signals and systems. 3. Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back 4. Analyze the linear time invariant systems by applying the concepts of convolution and correlation. 5. Analyze continuous systems & their realization using Laplace transform. 6. Analyze discrete time systems & their realization using Z-transform.
Pulse & Digital Circuits	1. Analyze the response of linear wave shaping circuits for different signals. 2. Sketch the response of non-linear wave shaping circuits using non-linear elements and observe the transfer characteristics. 3. Design Bistable Multivibrators by understanding the switching characteristics of diode & transistor 4. Design Monostable and Astable Multi vibrators and their time period analysis. 5. Illustrate the working of voltage time base generators for generation of sweep waveforms. 6. Interpret the construction and operation of logic gates and

	sampling gates using diodes and transistors.
Power Electronics	1. Explain the switching operation of power semiconductor devices 2. Apply the concept of single phase converters for DC loads 3. Apply the concept of three phase converters for DC loads 4. Design DC-DC converter for photovoltaic applications using simulation software like MATLAB,CADENCE,PROTEUS etc 5. Demonstrate the harmonic reduction techniques and operation of inverter. 6. Analyze the operation of AC-AC regulators
Electrical Machines-II Laboratory	1. Determine the Efficiency & Regulation of Transformers and draw their Performance curves 2. Student can understand the concepts of Scott Connection Of Transformers 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. 4. perform Various Tests in Induction Motor for assessing its performance characteristics 5. Perform Synchronization Of Alternator By Dark Lamp Method
Control Systems Laboratory	1. Analyze the Time Response of Second Order System and determine the stability of classical control system. 2. Assess the Characteristics of Synchros, Magnetic Amplifiers, AC and DC Servo Motors. 3. Understand the Effect of P, PI, PD & PID controllers on Second Order System. 4. Analyze the Temperature Controller using PID, Lead and Lag Compensators. 5. Determine the Transfer Function of DC motor 6. Examine the DC Position control system, potentio meter as an error detector and observe the effect of DC servomotor.
Electrical Measurements Laboratory	1. Understand the concepts of measurements of electrical quantities and calibration of different electrical measuring instruments. 2. Determination of 3-phase reactive power of balanced loads using wattmeters. 3. Determination of 3-phase reactive power of balanced loads using two CT's 4. Testing and calibration of various electrical quantity measuring instruments. 5. Measurement of the basic elements (R,L & C) in electrical circuits using different AC & DC Bridges. 6. Study the three voltmeter and 3 ammeter concept to measure various parameters of electrical circuits.
IPR & Patents	1. Knowledge on basic concepts of Intellectual Property , Innovations and Inventions of Intellectual Property Law 2. Evaluate the principles and rights afforded by Copyright, its infringement and International Copyright Law. 3. Analyze Patent registration requirements, infringement and Litigation, new developments and international laws 4. Registration Process of Trade Marks, Inter-parties proceedings, litigations , claims and global factors related to trade marks

	5. Conceptual awareness about trade Secrets, Employee Confidentiality Agreement, Trade Secret Litigation and breach of law. 6. Elucidate Cyber Law and Cyber Crimes , E-commerce, International aspects of Computer and Online Crime
III Year - II Semester (R16)	
Power Electronic Controllers & Drives	1. Understand the fundamentals of electric drive and different electric braking methods. 2. Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters. 3. Understand and analyze the converter control of dc motors in four quadrants. 4. Understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters. 5. Understand the principles of static rotor resistance control and various slip power recovery schemes. 6. Understand the speed control mechanism of synchronous motors.
Power System Analysis	1. Apply the mathematical knowledge of per-unit quantities for the formation of Y-bus matrix to the power system 2. Analyze the numerical methods for the power flow studies 3. Analyze the formation of Z_{BUS} building algorithm of power system network 4. Analyze the symmetrical faults in power system components 5. Understand the concept of symmetrical component theory and its application for unsymmetrical fault analysis 6. Explain stability and various methods to improve stability of power system
Micro Processors and Micro controllers	1. Illustrate the internal architecture and working of various features of 8086 microprocessor and its successors 80286, 80386, 80486, Pentium. 2. Extend the 8086 functions with various operating modes, instruction set and addressing modes. 3. Identify assembler directives and apply the assembly language programming to solve different problems. 4. Outline various peripheral control ICs such as 8255, 8279, 8257 and 8259 and also write programs to develop different applications using them. 5. Illustrate the architecture, memory, timer, serial communication, controlling functions of 8051 microcontroller. 6. Develop assembly language programs of 8051 microcontroller to control push button, LED, hex keypad, relay and latches commonly used in real world applications.
Data Structures	1. Distinguish between procedures and object oriented programming. 2. Apply advanced data structure strategies for exploring complex data structures. 3. Compare and contrast various data structures and design

	techniques in the area of Performance. 4. Implement data structure algorithms through C++. 5. Incorporate data structures into the applications such as binary search trees, AVL and B Trees 6. Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs
Energy Audit and Conservation& Management	1. Understand energy efficiency, scope, conservation and technologies. 2. Design of energy efficient lighting systems 3. Estimate/Calculate power factor of systems and propose suitable compensation Techniques 4. Understand energy conservation in HVAC systems. 5. Calculation of life cycle costing analysis and replacement analysis and Depreciation methods. 6. Understand Cash flow diagram and Calculate most economical power factor and computation of economic analysis on energy efficient technologies
Power Electronics Laboratory	1. Design and development of Power electronic based hardware circuits 2. Study the characteristics of various solid state devices 3. Study of Power conversion from AC to DC and vice versa using appropriate converter circuits (Single phase and Three phase) 4. Understand the operation of various power electronic circuits for variable voltages in both AC and DC circuits. 5. Understand the operation of various power electronic circuits for variable frequencies. 6. Application of Power electronic converters for four quadrant operation of DC machines
Microprocessors & Microcontrollers Laboratory	1. Develop Assembly language programs to demonstrate the arithmetic operations of binary, BCD, ASCII and Boolean logical operations. 2. Examine different string based operations in assembly language such as moving string, finding length of string, reverse of string, insertion, deletion, sorting. 3. Develop programs for different peripheral control ICs for 8086. 4. Develop assembly language programs to make use of different features of 8051 like parallel ports, timers and serial port. 5. Construct real world embedded applications with PIC18 microcontroller.
Data Structures Laboratory	1. Analyse different searching and sorting Techniques. 2. Apply logical ability to solve the problems related to linked list. 3. Apply logical ability to solve the problems of stack and queue applications. 4. Implementation of trees and their operations. 5. Evaluate binary search tree operations. 6. Analyse different graph operations.
IV Year - I Semester (R16)	
Utilization of Electrical Energy	1. Identify a suitable motor for electric drives and industrial Applications. 2. Identify most appropriate heating or welding techniques for

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	suitable applications.
	3. Understand various level of luminosity produced by different illuminating sources.
	4. Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting.
	5. Determine the speed/time characteristics of different types of traction motors.
	6. Estimate energy consumption levels at various modes of operation.
Linear & Digital IC Applications	1. Explain the basic concepts and performance parameters of Differential Amplifiers and their stages.
	2. Interpret the characteristics of Op-Amp and measurement of its parameters
	3. Apply Op-Amp circuits for various Linear and Nonlinear Applications.
	4. Design of active filters, analog multipliers and Modulator circuits using Op-Amps.
	5. Analyse the architecture and working of Timers and PLL used in various Analog and Digital circuit applications.
	6. Design the different methods of A/D and D/A converters and compare their performance parameters.
Power System Operation & Control	1. Compute optimal scheduling of Generators.
	2. Study and understand the Optimal scheduling of hydrothermal systems
	3. Computation of Cost function formulation and understand the unit commitment problem.
	4. Modeling of Turbine Generator sets and understands role of the frequency.
	5. Significance of Economic dispatch control and load frequency control in two area systems
	6. Understand the reactive power control and compensation for transmission systems
Switchgear and Protection	1. Understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.
	2. Understand the working principle and constructional features of different types of electromagnetic protective relays, static relays and digital relays.
	3. Acquire in-depth knowledge of faults that are observed to occur in high power generator and transformers and protective schemes used for all protections.
	4. Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
	5. Understand the different types of overvoltage's appearing in the system, including existing protective schemes required for insulation coordination.
	6. Recall the protection against overvoltage's and working of lightning arrester
Instrumentation	1. Represent of various types of signals and their performance

	characteristics
	2. Classification and operation of different types of transducers
	3. Measurement of different types of Non–electrical quantities.
	4. Understand the construction and working principle of various types of digital voltmeters
	5. Block diagram representation and operation of CRO, measurement of different parameters (phase and frequency) of a signal.
	6. Study the concepts of different types of signal analyzers
Electric Power Quality	1. Differentiate between different types of power quality problems.
	2. Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
	3. Explain the principle of voltage regulation and power factor Improvement methods.
	4. Analyze the effects of Harmonic Distortion & their solutions.
	5. Demonstrate the relationship between distributed generation and power quality.
	6. Explain the power quality monitoring concepts and the usage of measuring instruments.
Special Electrical Machines	1. Obtained the knowledge about the construction, operation and characteristics of permanent magnet DC motor.
	2. Understand the operation, performance and different control techniques of stepper motors.
	3. Understand the operation, design and control of switched reluctance motor.
	4. Describe the operation and the logic scheme of square wave BLDC motor.
	5. Understand the operation and the logic scheme of sine wave BLDC motor.
	6. Explain the construction, operation and applications of linear induction motors.
Electrical Simulation Laboratory	1. Analyze and study the PSPICE & MATLAB simulations in application to electrical systems.
	2. Design and analyze the behaviour of RLC electrical circuits with different inputs.
	3. Understand and simulate the significant power system aspects like, Transmission line simulation, Transformer modeling, Load flow studies and Load frequency control.
	4. Design and simulate various electronic circuits.
	5. Understand the Modeling and Stability analysis of different electrical systems by Transfer function approach.
Power Systems & Simulation Laboratory	1. Determine the sequence impedance of Alternator and Transformer.
	2. Determine the transmission line parameters and study the Ferranti Effect.
	3. Estimate the dielectric breakdown voltage of liquid insulants.
	4. Study the operation and calibrate tong tester.
	5. Design and simulation of load frequency controllers, stability analysis and load flow studies of power system network.

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IV Year - II Semester (R16)	
Digital Control Systems	1. Learn the advantages, disadvantages and real time applications like Aircraft control, rolling mills e.t.c with their conversion techniques of discrete time control systems. 2. Apply the concepts of Z, inverse Z transformations and their role in the mathematical analysis of different discrete time systems. 3. Understand the concepts of State Space Representation, Controllability and Observability of discrete time systems 4. Determine the stability of digital control systems and understand the concept of S to Z plane mapping. 5. Design discrete time control system by conventional methods for Lead, Lag and Lead-Lag compensators and digital PID controllers. 6. Design State feedback controller through pole placement.
HVDC Transmission	1. Develop the knowledge of HVDC transmission with regard to terminal equipment's, type of HVDC connectivity and planning of HVDC system. 2. Develop knowledge with regard to choice of pulse conversion and converter configurations 3. Formulate and solve mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC link 4. Develop knowledge of reactive power requirements of conventional control and reactive power compensation in AC side of HVDC system and AC/DC load flow. 5. Analyse the nature of faults happening on both the AC and DC sides of the converters and effects of harmonics 6. Design different low pass and high pass filters.
Electrical Distribution Systems	1. Explain the various factors of distribution system and understand the planning of distribution system 2. Design the substations and understand the need of feeder voltage levels. 3. Determine the voltage drop and power loss for different load areas. 4. Analyze and Compare the various protection schemes and its coordination Procedure. 5. Understand the effect of compensation on P.F improvement and Analyze various voltage control methods 6. Analyze various voltage control methods
Flexible Alternating Current Transmission Systems	1. Understand the concept of power flow control in transmission lines using FACTS controllers.9 2. Acquire knowledge on operation and control of voltage source converter. 3. Explain compensation methods to improve stability and reduce power oscillations in the transmission lines. 4. Application of static VAR compensators for shunt compensation. 5. Appreciate the methods of compensations by using series compensators. 6. Explain the operation of Unified Power Flow Controller (UPFC)
Power System	1. Understand fundamentals of power system deregulation and

Reforms	restructuring
	2. Understand OASIS and available power transfer capability calculations
	3. Understand concept of congestion management and methods to relieve congestion management
	4. Understand electricity pricing
	5. Understand operation of power system in deregulated environment.
	6. Understand importance of Ancillary services management.
Project	1. Apply the concepts of electrical engineering to analyze the ideas students and design the physical/simulation model.
	2. Enable students to work as an individual in a team inculcating leadership, management and financial oriented skills.
	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.
	4. Design and develop models that are useful for the society/environment by following research ethics and values.
	5. Improve writing and presentation skills of students so as to enable the work done by them to get published.

K. S-Resome

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