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
E-Mail: lendi_2008@yahoo.com   Website: www.lendi.org

Department of Electrical and Electronics Engineering

COURSE OUTCOMES
Academic Year: 2020-21

I-Year I-Semester (R20)	
Subject Name	**Course Outcomes**
Communicative English (R20BSH-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. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively. 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. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely. 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. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates. 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 cliches, 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
Numerical Method and Ordinary Differential Equations (R20BSH-MA1101)	1. Solve non-linear equations using various numerical methods and apply numerical methods to find interpolation polynomial for a given data.(L2) 2. Apply numerical methods to evaluate derivatives and integration of a function and find the solutions of ordinary differential equations. (L3) 3. Solve the first order ordinary differential equations related to

	various engineering fields. (L3) 4. Solve the higher order differential equation and analyze physical situations. (L3) 5. Apply the Laplace transform for solving differential equations and integral equations. (L3)
Engineering Chemistry (R20BSH-CH1102)	1. Distinguish thermoplastics and thermosetting plastics. (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 & explain the applications of semiconductors and superconductors. (L4) 5. Illustrate the preparation, properties and applications of Nano materials and importance of liquid crystals. (L2)
Computer Programming in C (R20CSS-ES1101)	1. Illustrate the Fundamental concepts of Computers and basics of computer programming. 2. Use Control Structures and Arrays in solving complex problems. 3. Develop modular program aspects and Strings fundamentals. 4. Demonstrate the ideas of pointers usage. 5. Solve real world problems using the concept of Structures and Unions.
Engineering Drawing (R20MEC-ES1101)	1. Apply the basics of engineering drawing to construct the polygons, curves and orthographic projections of points. (L3) 2. Draw the orthographic projections of straight lines inclined to both the planes. (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. Develop 3D isometric views from 2D orthographic views and vice versa. (L6)
Engineering Chemistry Lab (R20BSH-CH1105)	1. Explain the functioning of the instruments such as Conductivity and pH meters. (L-2) 2. Interpret the graphical values to analyze the experimental results. (L-2) 3. Determine the concentrations of Acid, Zinc and Copper. (L-5) 4. Prepare polymers and Nano materials. (L-4) 5. Identify the safety precautions to carry out the experiments in the laboratory using chemicals. (L-3)
Computer Programming in C Lab (R20CSS-ES1103)	1. Implement basic programs in C and design flowcharts in Raptor. 2. Use Conditional and Iterative statements to solve real time scenarios in C. 3. Implement the concept of Arrays and Modularity and Strings. 4. Apply the Dynamic Memory Allocation functions using pointers. 5. Develop programs using structures.
Electrical Engineering Workshop (R20EEE-ES1104)	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)
	I-Year II-Semester (R20)
Linear Algebra and Multivariable Calculus (R20BSH-MA1201)	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 system. (L3) 3. Apply partial differentiation to find maxima and minima of functions of several variables 4. Evaluate the volume and surface area of solids using multiple integrals. (L3) 5. Apply vector differential operators to find potential functions and estimate the work done against a field, circulation and flux using vector integral theorems. (L3)
Mathematical Techniques (R20BSH-MA1203)	1. Apply mean value theorems to real world problems.(L3) 2. Apply Z-transforms to find solutions of difference equations. (L3) 3. Find the Fourier series of functions (L3) 4. Evaluate Fourier integral, Fourier transform and inverse Fourier of a given function. (L3) 5. Solve partial differential equations of first order and higher order. (L2)
Applied Physics (R20BSH-PH1202)	1. Interpret the interaction of optic energy with matter on the basis of interference(L2) 2. Explain the diffraction of light by using diffraction grating(L2) 3. Apply the principles of polarization and Lasers to electrical and electronics systems(L2) 4. Enumerate the fundamentals of Fiber Optics and semiconductor physics (L2) 5. Identify the working of logic gates (L2)
Electrical Circuit Analysis – 1 (R20EEE-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. Analyze 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)
Thermal and Hydro Prime Movers (R20MEC-ES1204)	1. Understand the basic working principle for IC engines & fuel supply systems, cooling systems, ignition systems and lubrication systems for different types of engines (L2). 2. Understand the basic concept steam turbine and cycles(L2) 3. Understand the basic concept gas turbine and cycles and efficiency improving methods. (L2) 4. Explain the basic principle of jet and pumps and estimation of Hydrodynamic forces of Jets(L4) 5. Understand the basic working principles of Hydraulic turbines & estimation of efficiency and performance of the turbine. Also

	Analyze different loads on turbine of hydroelectric power plant(L4)
Communicative English Lab (R20BSH-EN1201)	1. Acquire Listening skills for answering questions, make formal presentations without graphical elements, prioritize information from reading texts, paraphrase short academic texts and get awareness about plagiarized content and academic ethics.
	2. Comprehend academic lectures by taking notes,, make formal presentations on academic topics using PPT slides with relevant graphical elements, distinguish facts from opinions while reading, write formal letters and emails and use a range of vocabulary in formal speech and writing.
	3. Participate in group discussions using appropriate language strategies, comprehend complex texts, produce logically coherent argumentative essays and use appropriate vocabulary to express ideas and opinions.
	4. Draw inferences and conclusions using prior knowledge and verbal cues, express thoughts and ideas accurately and fluently, develop advanced reading skills for a deeper understanding of texts, prepare a CV with a cover letter to seek internship/ job, and understand the use of passive voice in academic writing.
	5. Develop advanced listening skills for an in-depth understanding of academic texts, make presentations collaboratively, understand the structure of Project Reports and use grammatically correct structures with a wide range of vocabulary.
Applied Physics Lab (R20BSH-PH1204)	1. Apply the working principles of laboratory experiments in optics, electrical and electronics. (L3)
	2. Compute the required parameter by suitable formula using experimental values (observed values) in optics, electrical 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)
Engineering Workshop & IT Workshop Lab (R20MEC-ES1205)	1. Apply wood working skills in real world applications. (L3)
	2. Build different parts with fitting in engineering applications. (L3)
	3. Develop various basic prototypes in black smith & tiny smith applications. (L5)
	4. Apply different types of basic electric circuit connections. (L3)
	5. Understand the basic components, peripherals and basic operations of a computer. (L3)
Environmental Science (R20BSH-MC1201)	1. Understand about the environment and natural resources.
	2. Understands about various attributes of different types of pollution and their impacts on the environment and control methods along with waste management practices.
	3. Illustrate about the ecosystem and knows the importance of conservation of biodiversity.
	4. Relate the current environmental impacts with the societal

	5. Identify the current population explosion and their impacts on the environment.

	problems.
	5. Identify the current population explosion and their impacts on the environment.

II-Year I-Semester (R19)

Complex Variables, Probability and Statistics (R19BSH-MA2103)	1. Examine the analyticity of complex functions. (L3)
	2. Evaluate complex integration using Cauchy's theorems and Cauchy's residue theorem. (L3)
	3. Compute probabilities, theoretical frequencies using discrete and continuous probability distributions for real data. (L3)
	4. Apply the concept of hypothesis test to large samples. (L3)
	5. Apply statistical inferential methods to small samples. (L3)
Electrical Circuit Analysis-II (R19EEE-ES2101)	1. Solve three- phase circuits under balanced conditions (L3)
	2. Solve three- phase circuits under unbalanced conditions (L3)
	3. Apply the transient and steady state behaviour of RL, RC & RLC circuits in time and Frequency domain (L3)
	4. Explain the parameters for different types of two-port network (L2)
	5. Analyze electrical equivalent network for a given transfer function (L4)
Electrical Machines–I (R19EEE-PC2101)	1. Understand the concept of electromagnetic energy conversion(L2)
	2. Analyze the conditions required of Self Excitation of DC Generators and Parallel Operation of DC Generators (L4)
	3. Recognize the operation of DC Motor and starting & speed control techniques (L2)
	4. Explain the operation & Performance of single phase Transformer (L2)
	5. Analyze the construction of different Types of Three Phase Transformers & Autotransformers(L4)
Electronic Devices and Circuits (R19ECE-PC2101)	1. Understand the formation of p-n junction and how it can be used as a p-n junction diode in different modes of operation (L2)
	2. Understand the basic applications of Diodes as rectifier with and without filters (L2).
	3. Implement the nonlinear wave shaping circuits using diodes (L3)
	4. Understand the construction, principle of operation of BJT and FET and compare their V-I characteristics in different configurations (L2).
	5. Examine the various stability parameters of a Bipolar Junction Transistor in different biasing methods (L4)
Electromagnetic Fields (R19EEE-PC2102)	1. Understand the concepts of Coulomb's law, Gauss's law and their applications in electrostatics (L2)
	2. Analyze conduction, convention current densities, capacitance and energy stored in dielectrics (L4)
	3. Evaluate magneto static fields for simple configurations using Ampere's circuital law, magnetic forces, torque, magnetic dipole and dipole moment (L5)
	4. Analyze the magnetic potential, self and mutual inductances in magneto statics (L4)
	5. Understand the time varying electromagnetic fields (L2)
Managerial Economics &	1. Equipped with the knowledge of fundamentals of economics, estimating the Demand for a product, Capable of analysing

Financial Analysis (R19BSH-HM2101)	Elasticity & Forecasting methods (L2)
	2. Apply production concepts, assess the costs and Determine Break Even Point (BEP) of an enterprise for managerial decision making (L4)
	3. Identify the influence and price determination of various markets structures and knowledge of the forms of business organization and Business cycles (L4)
	4. Analyze and interpret the process & principles of accounting & apply financial statements for appropriate decisions to run the business profitably (L4)
	5. Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity (L4)
Thermal and Hydro Prime Movers Lab (R19MEC-PC2108)	1. Construct valve and port timing diagrams. (L3)
	2. Evaluate performance test on 4 -stroke Diesel engine and petrol engine. (L5)
	3. Determine FHP by conducting morse and motoring tests on 4 - stroke petrol engine and prepare heat balance sheet and perform speed test of an IC engine. (L5)
	4. Determine the efficiencies of pelton and francis turbines and single stage and multistage centrifugal pumps. (L5)
	5. Determine coefficient discharge of venturi and orifice meters and impact of jet on vanes and also determine of loss of head due to sudden contraction. (L5)
Electrical Circuit Laboratory (R19EEE-ES2102)	1. Verify network theorems (L5)
	2. Analyze the concepts of resonance and magnetic circuits (L4)
	3. Examine two port networks parameters (L4)
	4. Evaluate the powers in three phase network (L5)
	5. Determine the parameters of choke coil (L5)
Professional Ethics and Human Values (R19BSH-MC2104)	1. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field(L4)
	2. Develop the multiple ethical interests at stake in a real-world situation or practice(L3)
	3. Assess their own ethical values and the social context of problems(L5)
	4. Analyze ethical concerns in research and intellectual contexts, including academic integrity. (L4)
	5. Equip knowledge about global ethical issues. (L3)
English for Competitive Exams (R19BSH-MC2103)	1. Enable students to identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion.
	2. Attain Language Proficiency & Accuracy through Contextualized Vocabulary, Verb forms, Tense and subject verb agreement, produce coherent expressions for professional writing, introduce themselves unhesitatingly with Task-Based Activities.
	3. Develop the fluency and accuracy to write Technical Reports and Emails for professional communication by using appropriate vocabulary and participate confidently in any formal discussion.
	4. Assimilate lifelong reading habit to comprehend a passage for

	its gist. Avoid the errors in both Speech & Writing and write Letters and Emails for official communication.
	5. Realize the technical communicative competence and attainment of grammatically correct structures for formal communication.

<table>
<tr><td colspan="2" align="center">II Year –II Semester (R19)</td></tr>
<tr>
<td>Electrical Measurements and Instrumentation (R19EEE -PC2201)</td>
<td>
1. Choose the right type of instrument for measurement of voltage and current for AC and DC (L1)
2. Understand the principle of operation and working of different types of instruments (L2)
3. Calibrate ammeter, voltmeter, and wattmeter by using potentiometer (L5)
4. Select suitable bridge for measurement of electrical parameters (L3)
5. Identify different types of transducers and understand the operation and working of various of digital devices (L3)
</td>
</tr>
<tr>
<td>Electrical Machines – II (R19EEE-PC2202)</td>
<td>
1. Analyze principle and operation of three phase induction motors (L4)
2. Discuss the performance characteristics of three phase induction motor (L3)
3. Analyze performance characteristics of synchronous generator (L4)
4. Discuss the performance characteristics of synchronous motor (L3)
5. Understand the principle of operation of single-phase induction motors (L2)
</td>
</tr>
<tr>
<td>Digital Electronics (R19ECE-PC2206)</td>
<td>
1. Understand various number systems, error detecting and correcting binary codes (L2)
2. Apply Boolean laws, k-map & Q-M methods to minimize switching functions (L3)
3. Analyze the procedure to design combinational logic circuits (L4)
4. Analyze the procedure to design sequential logic circuits (L4)
5. Design of PLDs and synchronous sequential circuits (L6)
</td>
</tr>
<tr>
<td>Control Systems (R19EEE-PC2203)</td>
<td>
1. Develop the transfer function of physical systems using block diagram algebra and signal flow graphs (L3)
2. Apply the concepts of time response analysis on first and second order systems (L3)
3. Analyze the absolute stability and relative stability of control system by RH criterion and root locus techniques (L4)
4. Apply various frequency domain techniques to assess the system performance and stability (L3)
5. Analyze State space models of linear time invariant systems (L4)
</td>
</tr>
<tr>
<td>Power Systems – I (R19EEE-PC2204)</td>
<td>
1. Explain the layouts of conventional and non-conventional power stations (L2)
2. Calculate the consumer tariffs and the load capacity of the plant (L3)
3. Compute the transmission line parameters (L5)
4. Estimate the performance of transmission lines (L5)
5. Explain the construction and operation of Air and Gas Insulated
</td>
</tr>
</table>

	substations(L2)
Signals and Systems (R19ECE-PC2207)	1. Analyze the signal characteristics, operations on signals and system properties (L4). 2. Apply the Fourier series and Fourier transform to obtain the spectral characteristics of continuous time periodic and aperiodic signals (L3). 3. Determine the Nyquist rates of low pass and band pass signals by using sampling theorem (L3). 4. Analyze the linear time invariant systems by applying the concepts of convolution and correlation (L4). 5. Use Laplace transform and Z - transform to obtain pole-zero plot with ROC for continuous time discrete time signals (L3)
Electrical Machines – I Laboratory (R19EEE-PC2205)	1. Determine the performance of DC Shunt Generator (L5) 2. Determine the performance of DC Shunt Motor (L5) 3. Understand the Speed Control Techniques of DC Shunt Motor (L2) 4. Evaluate the performance of single-phase Transformers (L5) 5. Achieve Three Phase to Two Phase Transformation (L4)
Electronic Devices & Circuits Lab (R19ECE-PC2208)	1. Understand the switching characteristics of Diodes and Transistors applications (L1). 2. Analyze the working principle of BJT and FET in different configurations (L4). 3. Analyze the response of linear wave shaping circuits for different signals (L4). 4. Sketch the response of nonlinear wave shaping circuits using nonlinear elements (L3). 5. Identify the various stability parameters of a Bipolar Junction Transistor, Field Effect Transistor in different biasing methods (L3).
Essence of Indian Traditional Knowledge (R19BSH-MC2202)	1. Knowledge about the concept of traditional knowledge and analyze social context (L2) 2. Apply significance of traditional knowledge protection (L3) 3. Analyze various enactments related to the protection of plant varieties (L4) 4. Evaluate desired concepts of Intellectual property to protect the traditional knowledge(L4) 5. Compare the traditional knowledge in various sectors (L4)
English for Jobseekers (R19BSH-MC2203)	1. Understand the grammatical forms of English and the use of these forms in specific communicative and career context 2. Use a wide range of reading comprehension strategies appropriate to texts , to retrieve information 3. Strengthen their ability to write paragraphs, essays, emails and summaries 4. Improve their speaking ability in English both in terms of fluency and comprehensibility by participating in Group discussion and oral assignments 5. Prepare their own resume and answer interview related questions unhesitatingly with acceptable soft skills

K. S-Resswn
H.O.D, Dept. of E.E.E,
Lendi Institute of Engineering & Technology,
Jonnada, Denkada Mandal,
Vizianagaram - 535005.

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

K. J-Ramani

H.O.D, Dept. of E.E.E,
Lendi Institute of Engineering & Technology,
Jonnada, Denkada Mandal,
Vizianagaram - 535005.

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 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.
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 Reforms	1. Understand fundamentals of power system deregulation and 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.