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
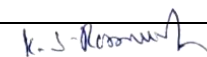Phone No. 08922-241111, 241112
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Department of Electrical and Electronics Engineering

COURSE OUTCOMES
Academic Year: 2021-22

I-Year I-Semester (R20)	
Subject Name and Code	**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 problems. |
| | 5. Identify the current population explosion and their impacts on the environment. |

<table>
<tr><td colspan="2" align="center">II-Year I-Semester (R20)</td></tr>
<tr>
<td>Complex Variables, Probability and Statistics (R20BSH-MA2102)</td>
<td>
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)
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<tr>
<td>Electrical Circuit Analysis-II (R20EEE-PC2101)</td>
<td>
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)
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<td>Electrical Machines-I (R20EEE-PC2102)</td>
<td>
1. Understand the unifying principles of electromagnetic energy conversion(L2)
2. Analyze the operation & performance of DC Generators and Parallel Operation of DC Generators (L4)
3. Recognize the operation, performance of DC Motor , starting and speed control techniques (L2)
4. Understand operation & performance of single phase Transformer (L2)
5. Analyze the construction , classification of Three Phase Transformers & Autotransformers (L4)
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<tr>
<td>Electronics Devices and Circuits (R20ECE-PC2101)</td>
<td>
1. Understand the working principle of various Diodes. (L1).
2. Understand the basic applications of Diodes as rectifier (L1).
3. Analyze the response of nonlinear wave shaping circuits for different signals (L4).
4. Study the working principle of transistors with different configurations(L1)
5. Identify the various stability parameters of a Bipolar Junction Transistor in different biasing methods (L3).
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<tr>
<td>Electro Magnetic Fields (R20EEE-PC2103)</td>
<td>
1. Understand the concepts of Coulomb's law, Gauss's law and their applications in electrostatics (L2)
2. Analyze 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)
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<tr>
<td>Electronics Circuits & PSpice Lab (R20EEE-PC2104)</td>
<td>
1. Analyze the working principle of BJT and FET in different configurations (L4).
2. Analyze the response of linear wave shaping circuits for different
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	signals (L4).
	3. Sketch the response of nonlinear wave shaping circuits using nonlinear elements (L3).
	4. Understand the switching characteristics of Diodes and Transistors applications (L2).
	5. Identify the various stability parameters of a Bipolar Junction Transistor, Field Effect Transistor in different biasing methods (L3).
Electrical Circuits Laboratory (R20EEE-PC2105)	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 networks (L5)
	5. Determine the parameters of choke coil (L5)
Thermal and Hydro Prime Movers Lab (R20MEC-ES2104)	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)
Introduction to MATLAB (Skill Oriented Course) (R20EEE-SC2101)	1. State the MATLAB environment and its applications(L1)
	2. Illustrate file management and the use of arrays and strings(L2)
	3. Develop program scripts and functions using MATLAB environment and to use basic flow controls (L6)
	4. Create plots and to carryout numerical computations and analysis(L6)
	5. Develop mathematical modelling of physical systems using Simulink(L6)
Essence of Indian Traditional Knowledge (R20BSH-MC2102)	1. Knowledge about the concept of traditional knowledge(L2)
	2. Apply significance of traditional knowledge protection(L3)
	3. Analyze various enactments related to the protecting facets of traditional knowledge. (L2)
	4. Evaluate the significance Traditional Knowledge and modern food. (L2)
	5. Compare the traditional knowledge in various sectors(L2)
II-Year II-Semester (R20)	
Power System-I (R20EEE-PC2201)	1. Understand the generation of electrical power from thermal power station.(L2)
	2. Understand the generation of electrical power from nuclear power plant. (L2)
	3. Classify the different components of air and gas insulated substations. (L2)
	4. Identify single core and three core cables with different insulating materials. (L3)
	5. Analyse the different economic factors of power generation and

	tariffs. (L4)
Electrical Machines-II (R20EEE-PC2202)	1. Understand principle and operation of three phase induction motors (L2) 2. Discuss the performance characteristics of three phase induction motor (L3) 3. Analyze performance characteristics of synchronous generator (L4) 4. Assess the performance characteristics of synchronous motor (L2) 5. Understand the principle of operation of single-phase induction motors (L2)
Digital Electronics (R20ECE-ES2201)	1. Describe 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. Design the combinational circuits (L5) 4. Design the sequential logic circuits (L5) 5. Compare different types of Programmable Logic Devices (L5)
Control Systems (R20EEE-PC2203)	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)
Managerial Economics & Financial Analysis (R20BSH-HM2101)	1. Equipped with the knowledge of fundamentals of economics, estimating the Demand for a product, Capable of analyzing 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)
Electrical Machines-I Lab (R20EEE-PC2204)	1. Understand the performance of DC Shunt Generator (L3) 2. Analyze the performance of DC Shunt Motor (L4) 3. Understand the Speed Control Techniques of DC Shunt Motor (L2) 4. Evaluate the performance of single-phase Transformers (L4) 5. Achieve Three Phase to Two Phase Transformation (L3)
Electrical Machines-II Lab (R20EEE-PC2205)	1. Assess the Performance of Single-Phase and Three Phase Induction Motor. (L3) 2. Speed control of Three Phase Induction Motor. (L3)

	3. Predetermine the Regulation of Three–Phase Alternator by various Methods. (L5) 4. Evaluate the X_d / X_q ratio of Alternator and asses the regulation of Three–Phase Synchronous Alternator (L5). 5. Determine V and Inverted V curves of a Three Phase Synchronous Motor (L5)
Control Systems Lab (R20EEE-PC2206)	1. Analyze the performance and working of Magnetic amplifier, D.C and A.C. servo motors (L4) 2. Design P, PI, PD and PID controllers. (L6) 3. Design lag, lead and lag–lead compensators (L6) 4. Determine the transfer function of D.C. motor (L5) 5. Test the performance of D.C servo motor using position control system.(L4)
Programmable Logic Control (Skill Oriented Course) (R20EEE-SC2201)	1. Understand the Basics of Programmable Logic Controllers (L2) 2. Understand the Different Hardware Components of PLC □ (L2) 3. Apply the knowledge of Basic programming techniques of PLC. (L3) 4. Understand different timers and Counters in PLC. (L2) 5. Design various application of PLC's (L2)
English for Competitive Exams (R20BSH-MC2202)	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.
III Year - I Semester (R19)	
Power Systems-II (R19EEE-PC3101)	1. Distinguish different types of insulators and analyze the phenomenon of corona(L2) 2. Calculate sag of transmission line or equal and unequal heights of towers (L3) 3. Analyze different types of transients in power systems (L4) 4. Analyze the construction, types and grading of underground cables (L4) 5. Analyze the various factors associated with power distribution (L4)
Power Electronics (R19EEE-PC3102)	1. Explain the characteristics of power semiconductor devices and the process of Turn-on and Turn-off semiconductor switches. (L2)

	2. Design the controlled rectifier circuits with R and RL-Loads. (L5) 3. Design the DC to DC choppers. (L5) 4. Analyze the operation of AC-AC converters. (L4) 5. Demonstrate the operation of single and their phase voltage source inverters. (L2)
Linear and Digital IC Applications (R19ECE-OE3101)	1. Understand the internal components and characteristics of Op-Amp (L1). 2. Understand the various linear and non-linear applications using Op-amps (L2). 3. Analyze active filters using Op-amp and understand the frequency response of the amplifier configurations (L3). 4. Understand thoroughly the function of ICs such as 555 and PLL (L4). 5. Acquire the knowledge about various techniques of ADCs and DACs (L5).
Big Data Analysis (R19CSE-OE3101)	1. Understand the generic data structures and implement the persistence of object using file IO. 2. Create and configure distributed Hadoop cluster by understanding HDFS architecture. 3. Implement the map reduce paradigm by analyzing different case studies. 4. Analyze data across distributed environment using hadoop writable APIs. 5. Generate map reduce jobs by writing pig Latin scripts and HIVE to handle different kinds of data.
Internet of Things (R19CSE-OE3102)	1. Illustrate the architecture and principles in Internet of Things. 2. Outline the Arduino platform and its applications. 3. Develop applications using Raspberry Pi. 4. Select protocols for a specific IoT application. 5. Utilize the cloud platform and APIs for IoT application.
Python Programming (R19CSE-OE3103)	1. Understand python shell environment and its program constructs. 2. Implement iterators and functions for data processing. 3. Implement modules and install packages. 4. Implement sequences and data structures for data organization. 5. Implement Object oriented concepts and handle different errors through exceptions.
Digital Control Systems (R19EEE-PE3101.1)	1. Understand the concepts of digital control systems (L2). 2. Understand z–transformations and mathematical analysis of digital control systems (L2). 3. Understand the concept of state–space analysis (L2). 4. Analyze the stability of the digital control systems (L2). 5. Analyze digital control systems in the w–plane and the design of state feedback controller (L4).
Electrical Machine Design (R19EEE-PE3101.2)	1. Understand the various factors influence the design of electrical machines. (L2) 2. Design the armature, commutator and brushes of DC machines. (L5) 3. Design the core, yoke, windings of transformers and also deign the rotor bars & slots and end rings of Induction motor. (L4)

	4. Design the field winding, damper winding and rotor of synchronous machines. (L4) 5. Use the software tools to design the calculation. (L6)
Embedded Systems (R19EEE-PE3101.3)	1. Interpret embedded system and its hardware and software. 2. Comprehend the knowledge of microcontrollers 3. Develop interfacing with hardware 4. Illustrate different types of operating systems and Multitasking 5. Apply embedded Software development tools and Design and develop the embedded system
Data Structures (R19CSE-ES3101)	1. Analyze different searching and sorting Techniques. 2. Apply the concepts of stacks and queues in real time applications 3. Analyze concepts of linked lists and with their implementation of different Linked Lists 4. Analyze the nonlinear data structures trees and their operations 5. Evaluating concepts of graphs and their applications
Electrical Machines-II Lab (R19EEE-PC3103)	6. Assess the Performance of Single-Phase and Three Phase Induction Motor. (L3) 7. Speed control of Three Phase Induction Motor. (L3) 8. Predetermine the Regulation of Three–Phase Alternator by various Methods. (L5) 9. Evaluate the X_d / Xq ratio of Alternator and asses the regulation of Three–Phase Synchronous Alternator (L5). 10. Determine V and Inverted V curves of a Three Phase Synchronous Motor (L5)
Control Systems Lab (R19EEE-PC3104)	6. Analyze the performance and working of Magnetic amplifier, D.C and A.C. servo motors (L4) 7. Design P, PI,PD and PID controllers. (L6) 8. Design lag, lead and lag–lead compensators (L6) 9. Determine the transfer function of D.C. motor (L5) 10. Test the performance of D.C servo motor using position control system.(L4)
Electrical Measurements and Instrumentation Lab (R19EEE-PC3105)	1. Understand the testing of transformer oil. (L2) 2. Understand the design and working of DC, AC bridges. (L2) 3. Analyze the dynamic response and calibration of few instruments. (L4) 4. Understand the measurement of devices, their characteristics and operation.(L2) 5. Analyze statistical data analysis. (L4)
Data Structures Lab (R19CSE-SD3101)	1. Analyze different searching and sorting Techniques. 2. Analyze concepts of linked lists and with their implementation of different Linked Lists 3. Apply the concepts of stacks and queues in real time applications 4. Analyze the nonlinear data structures trees and their operations 5. Implementation of different advanced Trees, Graphs with their applications.
Entrepreneurship and Incubation (R19BSH-MC3102)	1. Enriches the knowledge of Entrepreneurial behavior, and skill development. 2. Initiate business ideas that have value in the end-market.

	3. Identify the validity of idea and its unique selling proportion.
	4. Comprehend opportunity and challenges of-start up.
	5. Analyze various Government and non-Government financial resource.

III Year - II Semester (R19)

Electric Drives (R19EEE-PC3201)	1. Analyze the characteristics of a DC motors.(L4)
	2. Understand the process for speed control of DC motors by choppers. (L2)
	3. Analyze the process for speed control of DC motors in four quadrants.(L4)
	4. Analyze the characteristics of an Induction Motor from the fundamental equations.(L4)
	5. Understand the speed control of squirrel cage and slip ring Induction Motor by controlling the stator and rotor parameters.(L2)
Power System Analysis (R19EEE-PC3202)	1. Apply the mathematical knowledge of per-unit quantities for the formation of Y-bus matrix to the power system (L3)
	2. Analyze the numerical methods for the power flow studies(L4)
	3. Develop the Z_{BUS} Matrix using step by step procedure of a power system network(L3)
	4. Analyze the unsymmetrical faults in power system (L4)
	5. Explain stability and various methods to improve stability of power system(L2)
Microprocessors and Microcontrollers (R19ECE-PC3207)	1. Distinguish between microprocessors & microcontrollers (L2)
	2. Develop assembly language programming Using assembler directives.(L2)
	3. Describe interfacing of 8086 with peripheral devices (L3)
	4. Discuss architecture and features of Intel 8051 microcontroller (L2)
	5. Develop assembly language programming Using 8051 instructions. (L3)
Switchgear and Protection (R19EEE-PC3203)	1. Solve numerical problems for arc interruption and recovery in circuit breakers (L3)
	2. Understand the principles of operation of electromagnetic relays (L2)
	3. Determine the unprotected percentage of generator and transformer winding under fault conditions (L3)
	4. Explain the use of relays in protecting feeders, lines and bus bars (L2)
	5. Understand and elaborate the working principle and operation of different types of static relays and understand different types of over voltages and protective schemes required (L4)
Advanced Control Systems (R19EEE-PE3201.1)	1. Understand the State space representation of control system and formulation of different state models (L2).
	2. Design of control system using the pole placement technique after introducing the concept of controllability and observability(L5)
	3. Analyze the nonlinear system using the describing function technique and phase plane analysis(L4)
	4. Analyze the stability of nonlinear systems using Lyapunov's

	method(L4)
	5. Understand the concept of different nonlinear controllers(L2)
HVAC Transmission (R19EEE-PE3201.2)	1. Calculate the line inductance and capacitance of bundle conductors.(L3) 2. Calculate electrostatic field of AC lines and Effect of high electrostatic field on biological organisms and human beings (L3 & L4) 3. Understand the sources and impacts of corona in EHV lines(L2) 4. Analyze compensated devices for voltage control(L4) 5. Design filters for suppressing harmonics injected into the system (L3)
Special Electrical Machines (R19EEE-PE3201.3)	1. Distinguish between brush dc motor and brush less dc motor. (L4) 2. Explain the performance and control of stepper motors, and their applications. (L2) 3. Explain theory of operation and control of switched reluctance motor. (L2) 4. Explain the theory of travelling magnetic field and applications of linear motors. (L2) 5. Understand the significance of electrical motors for traction drives. (L2)
Wavelet Transforms (R19EEE-PE3201.4)	1. Classify various wavelet transform and explain importance of it (L2). 2. Describe Continuous Wavelet Transform (CWT) and Discrete Wavelet Transform (DWT) (L2). 3. Explain the properties and application of wavelet transform. (L2). 4. Develop and realize computationally efficient wavelet-based algorithms for signal and image processing. (L3). 5. Explain brief features and applications of wavelet transform. (L2).
Communication Systems (R19ECE-OE3201)	1. Explain the concept of amplitude and angle modulations(L2) 2. Understanding the concept of noise in communication systems(L2) 3. Describe various pulse communication schemes(L2) 4. Analyze various pulse transmission schemes(L4) 5. Explain the errors obtained in the communication system by using error Control coding techniques (L2)
Data Base Management System (R19CSE-OE3203)	1. Understand File System Vs Databases. 2. Design and implement ER-model and Relational models. 3. Construct simple and Complex queries using SQL. 4. Analyze schema refinement techniques. 5. Design and build database system for a given real world problem.
OOPS Through JAVA (R19CSE-OE3201)	1. Understand the environment of JRE and Control Statements. 2. Implement real world objects using class Hierarchy. 3. Implement generic data structures for iterating distinct objects. 4. Implement error handling through exceptions and file handling through streams. 5. Design thread-safe GUI applications for data communication

	between objects.
Robotics (R19MEC-OE3201)	1. Explain fundamentals of Robots. (L2) 2. Apply kinematics and differential motions and velocities. (L3) 3. Demonstrate control of manipulators. (L2) 4. Understand robot vision. (L2) 5. Develop robot cell design and programming. (L3)
Power Electronics Lab (R19EEE-PC3204)	1. Discuss the characteristics of various power electronic devices (L6). 2. Analyze the performance of single–phase and three-phase AC-DC converters with both resistive and inductive loads (L4). 3. Develop the single phase and three phase AC voltage regulator (L6). 4. Design the Buck converter and Boost converter (L6). 5. Understand single–phase square wave inverter with PWM technique (L2)
Microprocessors & Microcontrollers Lab (R19ECE-PC3208)	1. Develop programming skills for data operations and different interfacing circuits of microprocessor and microcontrollers. 2. Develop 8086 Assembly language programs to demonstrate the arithmetic operations of binary, BCD, ASCII, logical operations and standard DOS functions to display message on screen, reading keys from keyboard with and without echo. 3. Examine different string, branch and process control-based operations in assembly language such as moving string, finding length of string, reverse of string, insertion, deletion, sorting. 4. Demonstrate the process of interfacing 8086 microprocessor with peripheral control ICs like 8255 and 8259. 5. Develop assembly language programs to make use of parallel ports, timers and serial port of 8051 microcontroller.
Electrical Engineering Virtual Lab (R19EEE-SD3201)	1. Analyze Basic Laws & Theorems.(L2) 2. Analyze the performance and characteristics of DC Machine.(L3) 3. Obtain Equivalent circuit parameters of Induction Motor.(L3) 4. Control the Speed of Induction Motor.(L2) 5. Develop the V & Inverted V Curves of Three–Phase Synchronous Motor.(L4)
Introduction to MATLAB (R19EEE-SD3202)	1. State the MATLAB environment and its applications(L1) 2. Illustrate file management and the use of arrays and strings(L2) 3. Develop program scripts and functions using MATLAB environment and to use basic flow controls (L6) 4. Create plots and to carryout numerical computations and analysis(L6) 5. Develop mathematical modeling of physical systems using Simulink(L6)

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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

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	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.