LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUGV, Vizianagaram
Accredited by NAAC with "A" Grade and NBA (CSE, ECE, EEE & ME)
E-Mail: lendi_2008@yahoo.com Website: www.lendi.org

Department of Electrical and Electronics Engineering
Course Outcomes (COs) of all Courses
2019-2023 Batch

Subject Name	NBA Code	Course Outcomes
English	C101.1	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(L2)
	C101.2	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(L1)
	C101.3	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(L1)
	C101.4	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(L3)
	C101.5	Learn meaningful use of language by avoiding meaningless clichés, bureaucratic euphemisms and academic jargon in order to acquire the skill of summarizing. Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading(L1)
Linear Algebra and Ordinary Differential Equations	C102.1	Apply the matrix algebra techniques to engineering applications(L3)
	C102.2	Apply the concepts of eigen values and eigen vectors to free vibration of a two mass system(L3).
	C102.3	Apply mean value theorems to real world problems (L3).
	C102.4	Apply the first order ordinary differential equations to solve various engineering problems(L3).
	C102.5	Apply the higher order ordinary differential equations to solve various engineering problems(L3).

Subject Name	NBA Code	Course Outcomes
Engineering Chemistry	C103.1	Distinguish thermoplastics, thermosetting plastics and elastomers(L2)
	C103.2	Design the metallic materials to prevent the corrosion(L3)
	C103.3	Discuss the working principle and applications of primary, secondary battery cells, fuel cells and Photo Voltaic Cell(L2)
	C103.4	Understand the applications of superconductors semiconductors and storage devices(L2)
	C103.5	Illustrate the preparation, properties and applications of Nano materials and importance of green chemistry(L2)
Problem Solving and Programming using C	C104.1	Develop Algorithms and flowcharts and also understand the compilation, debugging, execution and writing of basic C programs (L3).
	C104.2	Develop C Programs using control and iterative statements (L3).
	C104.3	Develop C programs using Arrays and functions (L3).
	C104.4	Apply the knowledge of strings and pointers in programming (L3).
	C104.5	Comprehend file handling and user defined data types (L3).
Environmental Science	C105.1	Understand the significance of various natural resources, including renewable, non renewable water, minerals, forests and soil, in the environment and the problems associated with it in maintaining ecological balance and supporting human activities(L2)
	C105.2	Apply strategies for mitigating different types of environmental pollution, managing solid waste effectively and adopt individual actions that contribute to pollution prevention and waste reduction(L3)
	C105.3	Understand the structure, function, characteristic features of different kind of eco systems, value of biodiversity, threats to bio diversity and India's role and strategies in the conservation of biodiversity for sustainable development(L2)
	C105.4	Apply the Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, and Forest Conservation Act to promote sustainable environmental development; Address related social issues and propose effective solutions, delving into the intersection of environmental policies and community welfare to achieve ultimate sustainability goals(L3)
	C105.5	Identify the role of information technology in addressing population-related problems, focusing on resource management, environmental monitoring, urban planning, healthcare improvement, education to enhance sustainability and quality of life(L2)

Subject Name	NBA Code	Course Outcomes
Communicative English Lab -I	C106.1	Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively(L2)
	C106.2	Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely(L2)
	C106.3	Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates (L2)
	C106.4	Acquire effective strategies for good writing and demonstrate the same in summarizing and reporting(L2)
	C106.5	Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations(L2)
Engineering Chemistry Lab	C107.1	Explain the functioning of the instruments such as pH, Viscometer, Conductivity and Potentiometric meters(L2)
	C107.2	Interpret the graphical values to analyze the experimental results(L2)
	C107.3	Determine the concentrations of Acid, Zinc, Iron and Copper(L1)
	C107.4	Compare viscosities of different oils(L2)
	C107.5	Prepare polymers and nano materials(L1)
Problem Solving and Programming using C Lab	C108.1	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(L1)
	C108.2	Understand C programming development environment and also how to compiling, debugging, and linking a Program using C Language(L2)
	C108.3	Apply arrays, strings concepts to solve problems(L3)
	C108.4	Understand and apply the in-built functions and customized functions for solving the problems(L2)
	C108.5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems(L2)
Electrical Engineering Workshop	C109.1	Explain the limitations, tolerances, Safety aspects of electrical systems and wiring(L2)
	C109.2	Select wires/cables and other accessories used in different types of wiring(L2)
	C109.3	Make simple lighting and power circuits(L1)
	C109.4	Measure current, voltage and power in a circuit(L2)

Subject Name	NBA Code	Course Outcomes
	C109.5	Apply starting methods to AC and DC Machines(L3)
Numerical Methods and Multi Variable Calculus	C111.1	Apply complex integration techniques to find the velocity potential and flux functions of flow problems(L3)
	C111.2	Evaluate complex integrals using contour integration techniques, including Cauchy's integral theorem and residue theorem(L2)
	C111.3	Apply multiple integral methods to find the areas and volumes of solids(L3)
	C111.4	Analyze the behaviour of fluid flow, electromagnetic fields, and other physical phenomena in engineering using vector differentiation(L4)
	C111.5	Analyze quantitative measures (like Volume, Mass, Center of Mass, Surface Area, Moment of Inertia) of physical and engineering fields using multiple integrals(L4)
Transform Techniques and Partial Differential Equations	C112.1	Apply the Laplace transform to solve differential equations and integral equations that arise in various engineering fields(L3)
	C112.2	Apply multi variable calculus to solve optimization problems(L3)
	C112.3	Find the Fourier series of periodic functions and evaluate Fourier integral, Fourier transform and inverse Fourier of a given function(L2)
	C112.4	Apply the partial differential equations to solve various engineering problems(L3)
	C112.5	Understand the concept of Z Transforms and able to solve difference equations(L2)
Thermal and Hydro Prime Movers	C113.1	Classify internal combustion engine and Evaluate the performance of IC engines(L2)
	C113.2	Estimate the performance of a steam turbine using vapor power cycles and velocity diagrams(L2)
	C113.3	Analyze the different methods for improving the efficiency of gas turbines(L4)
	C113.4	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines, centrifugal pump(L3)
	C113.5	Calculate the performance characteristics of a Hydraulic turbine at different loads (L2)
Applied Physics	C114.1	Apply the principles of acoustics and Ultra sonics for noise reduction (L3)
	C114.2	Develop the relationship between elastic constants(L3)
	C114.3	Identify the principles of lasers and mechanics (L2)
	C114.4	Explain the various types of crystal systems and nano materials(L2)

Subject Name	NBA Code	Course Outcomes
	C114.5	Demonstrate the working principles of heat engine and refrigerator using laws of thermodynamics(L3)
Electrical Circuit Analysis I	C115.1	Understands V-I relationships of basic circuit elements and network reduction techniques(L2)
	C115.2	Determine of co-efficient of coupling for a given magnetic circuit(L3)
	C115.3	Analyses single phase ac circuits and understands concepts of phase and power factor(L4)
	C115.4	Extends knowledge of dc analysis to ac circuits and determines selectivity of a RLC resonant circuit(L2)
	C115.5	Simplify complex electrical networks by using various network theorems(L2)
Applied Physic Lab	C116.1	Apply the working principles of laboratory experiments in optics, mechanics, electromagnetic and electronics and perform the experiments using required apparatus. (L3)
	C116.2	Compute the required parameter by suitable formula using experimental values (observed values) in mechanics, optics, electromagnetic and electronic experiments. (L3)
	C116.3	Analyze the experimental results through graphical interpretation. (L4)
	C116.4	Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory. (L2)
	C116.5	Demonstrate the working principles, procedures and applications. (L3)
Communicative English Lab - II	C117.1	Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively(L2)
	C117.2	Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely(L2)
	C117.3	Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates (L2)
	C117.4	Acquire effective strategies for good writing and demonstrate the same in summarizing and reporting(L1)
	C117.5	Gain knowledge of grammatical structures and vocabulary for day-to-day successful conversations(L1)
Engineering Drawing	C118.1	Apply the basics of engineering drawing to construct the polygons and curves. (L3)
	C118.2	Draw the orthographic projections, used in points and lines. (L3)

Subject Name	NBA Code	Course Outcomes
	C118.3	Draw the projections of planes in various conditions. (L3)
	C118.4	Draw the projections of regular solids inclined to one of the planes. (L3)
	C118.5	Imagine the isometric views of orthographic views and vice versa. (L3)
Engineering Workshop & IT Workshop Lab	C119.1	Apply wood working skills in real world applications. (L3) Apply forging operations for different black smith applications. (L3)
	C119.2	Build different parts with fitting in engineering applications. (L3)
	C119.3	Apply forging operations for different black smith applications. (L3)
	C119.4	Understand the basic components, peripherals and basic operations of a computer (L3)
	C119.5	Get hands on experience in trouble shooting a system? (L3)
Constitution of India	C120.1	Understand historical background of the constitution making and its importance for building a democratic India. (L2)
	C120.2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary. (L2)
	C120.3	Understand the value of the fundamental rights and duties for becoming good citizen of India. (L2)
	C120.4	Analyze the decentralization of power between central, state and local self-government. (L4)
	C120.5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. (L3)

Subject Name	NBA Code	Course Outcomes
Complex Variables, Probability and Statistics	C201.1	Examine the analyticity of complex functions (L4)
	C201.2	Evaluate complex integration using Cauchy's theorems and Cauchy's residue theorem (L3)
	C201.3	Compute probabilities, theoretical frequencies using discrete and continuous probability distributions for real data (L3)
	C201.4	Apply the concept of hypothesis to test large samples (L3)
	C201.5	Apply statistical inferential methods to small samples (L3)
Electrical Circuit Analysis II	C202.1	Solve three- phase circuits under balanced conditions (L3)

Subject Name	NBA Code	Course Outcomes
	C202.2	Solve three- phase circuits under unbalanced conditions (L3)
	C202.3	Apply the transient and steady state behavior of RL, RC & RLC circuits in time and Frequency domain (L3)
	C202.4	Determine the parameters for different types of two-port network (L3)
	C202.5	Analyze electrical equivalent network for a given transfer function (L4)
Electrical Machines-I	C203.1	Apply the basic principles of electromagnetic induction and energy conversion mechanisms in electrical machines (L3)
	C203.2	Analyze the characteristics and performance of different types of DC generators (L4)
	C203.3	Analyze the performance characteristics of different types of DC motors including torque, speed and efficiency (L4)
	C203.4	Apply the knowledge of equivalent circuit and phasor diagrams to determine the performance of single-phase Transformer (L3)
	C203.5	Illustrate the construction and working principles of an autotransformer and a three-phase transformer (L2)
Electronic Devices and Circuits	C204.1	Illustrate the working principles and characteristics of various diodes (L2)
	C204.2	Analyze rectifiers using diodes with and without filters (L4)
	C204.3	Analyze the responses of non linear wave shaping circuits for different signal (L4)
	C204.4	Apply the Transistors as an Amplifier in different configurations (L3)
	C204.5	Identify the stability parameters of a bipolar junction transistor in different biasing methods (L3)
Electro Magnetic Fields	C205.1	Apply the concepts of Coulomb’s law, Gauss’s law, and their applications in electrostatics for different charge distributions (L3)
	C205.2	Apply the concepts of electric dipole to solve potential, electric field intensity, torque and capacitance for different configurations of capacitances (L3)
	C205.3	Analyze magnetostatic fields for simple configurations using Biot Savart’s Law, Ampere’s circuital law, magnetic dipole, dipole moments and its torque (L4)
	C205.4	Analyze the magnetic forces, and evaluate self and mutual inductances in magnetostatics (L4)
	C205.5	Apply Maxwell's equations in both integral and differential forms to address practical problems involving time-varying electromagnetic fields (L3)
Managerial Economics &	C206.1	Analyze macro, micro economic concepts useful for business units and determine influences of

Subject Name	NBA Code	Course Outcomes
Financial Analysis		demand and supply analysis(L4)
	C206.2	Understand the production functions , types of costs and solving engineering problems by applying knowledge of economics(L2)
	C206.3	Analyze the consciousness about market structures and pricing methods of industries(L4)
	C206.4	Identify the business as their own and understand different stages of business cycle (L3)
	C206.5	Evaluation of financial statements and their analysis through ratios etc.,(L3)
Thermal and Hydro Prime Movers Lab	C207.1	Analyse the valve and port timing diagrams of I.C. engines for both 2-stroke and 4-stroke engines(L4)
	C207.2	Analyse the performance parameters for both 4-stroke diesel and 2-stroke engines (L4)
	C207.3	Calculate the Engine Friction and Power Losses by conducting Morse test, retardation test, and motoring test (L3)
	C207.4	Understand the Heat Balance in I.C. Engines (L3)
	C207.5	Evaluate the performance of hydraulic machines such as Pelton wheels, Francis turbines, and centrifugal pumps (L5)
Electrical Circuits Laboratory	C208.1	Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagram (L2)
	C208.2	Apply various theorems to compare practical results obtained with theoretical calculations (L3)
	C208.3	Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.
	C208.4	Analyze different circuit characteristics with the help of fundamental laws and various configurations (L4)
	C208.5	Analyze the two port networks (L4)
Professional Ethics and Human values	C209.1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field (L2)
	C209.2	Develop the multiple ethical interests at stake in a real-world situation or practice (L3)
	C209.3	Assess their own ethical values and the social context of problems (L3)
	C209.4	Analyze ethical concerns in research and intellectual contexts, including academic integrity (L4)
	C209.5	Equip knowledge about global ethical issues (L2)

Subject Name	NBA Code	Course Outcomes
English for Competitive Exams	C210.1	Identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion. (L2)
	C210.2	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 Tingly with Task-Based Activities (L3)
	C210.3	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 (L3)
	C210.4	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 (L2)
	C210.5	Realise the technical communicative competence and attainment of grammatically correct structures for formal communication (L2)
Electrical Measurements and Instrumentation	C211.1	Choose the right type of instrument for measurement of voltage and current for AC and DC circuits (L2)
	C211.2	Explain the principle of operation and working of different types of instruments (L2)
	C211.3	Apply principles of potentiometer to calibrate ammeters, voltmeters, and wattmeters accurately (L3)
	C211.4	Analyze the performance of AC and DC bridges for measuring electrical parameters (L4)
	C211.5	Analyze the performance of different types of digital meters in measuring electrical quantities (L4)
Electrical Machines-II	C212.1	Examine the operating principles and performance characteristics of three-phase induction motors (L4)
	C212.2	Analyze the speed control methods, testing procedures, and performance characteristics of three-phase induction motors (L4)
	C212.3	Analyze the performance and synchronization of a synchronous generator (L4)
	C212.4	Analyze the performance characteristics of a synchronous motor (L4)
	C212.5	Explain the principle of operation of single-phase induction motors (L2)
Digital Electronics	C213.1	Understand different number systems, arithmetic operations on binary numbers, complements, and Error correcting and detecting codes (L2)
	C213.2	Apply Boolean laws, k-map & Q-M methods to minimize switching functions (L3)

Subject Name	NBA Code	Course Outcomes
	C213.3	Develop different combinational logic circuits such as Adders, Sub tractors, Comparators, Encoders, Decoders, Multiplexers and De-multiplexers (L3)
	C213.4	Develop various synchronous and asynchronous sequential logic circuits using Flip-Flops (L3)
	C213.5	Develop different types of Programmable Logic Devices and realize functions using PLDs (L3)
Control Systems	C214.1	Develop the transfer function of physical systems using block diagram algebra and signal flow graphs (L3)
	C214.2	Apply the concepts of time response analysis on first and second order systems (L3)
	C214.3	Analyze the absolute stability and relative stability of control system by RH criterion and root locus techniques (L4)
	C214.4	Apply various frequency domain techniques to assess the system performance and stability (L3)
	C214.5	Analyze State space models of linear time invariant systems (L4)
Power Systems-I	C215.1	Describe the operation of conventional and non-conventional power stations. (L2)
	C215.2	Analyse the factors like load demand, diversity, capacity, utilization, and plant use factors (L4)
	C215.3	Apply the concepts of conductors and calculate the resistance, inductance values for both single-phase and three-phase systems (L3)
	C215.4	Analyse the modelling, and representation techniques for different types of transmission lines (L4)
	C215.5	Describe the construction and operation of Air and Gas Insulated substations (L2)
Signals and Systems	C216.1	Analyze the signal characteristics, operations on signals, system properties, and Fourier series applications (L4)
	C216.2	Apply Fourier transforms for spectral analysis and the sampling theorem for signal reconstruction (L3)
	C216.3	Analyze linear time-invariant systems using convolution and correlation concepts (L4)
	C216.4	Analyze continuous-time signals using Laplace transform to obtain their pole-zero plot with ROC and characterize LTI systems (L4)
	C216.5	Analyze discrete-time signals using Z-transform to obtain their pole-zero plot with ROC and LTI system characterization (L4)
Electrical Machines-I Lab	C217.1	Analyze the principles and operational characteristics of DC Generators (L4)

Subject Name	NBA Code	Course Outcomes
	C217.2	Analyze the performance of DC Motors with direct and indirect loading (L4)
	C217.3	Describe the various speed control techniques of dc shunt motor (L2)
	C217.4	Evaluate the performance of Single-Phase Transformers (L5)
	C217.5	Analyze three phase to two phase transformation (L4)
Electronics Devices & Circuits Lab	C218.1	Illustrate the working principles and characteristics of various diodes (L2)
	C218.2	Analyze rectifiers using diodes with and without filters (L4)
	C218.3	Analyze the responses of non linear wave shaping circuits for different signal (L4)
	C218.4	Apply the Transistors as an Amplifier in different configurations (L3)
	C218.5	Identify the stability parameters of a bipolar junction transistor in different biasing methods (L2)
Essence of Indian Traditional Knowledge	C219.1	Compare physical and social contexts of traditional knowledge. (L2)
	C219.2	Interpret the role of government in harnessing (To protect natural resources) Traditional Knowledge (L2)
	C219.3	Analyze plant variant protections and evaluate farmers right act (L4)
	C219.4	Evaluate strategies to increase the protection of traditional knowledge and Intellectual Property Rights. (L3)
	C219.5	Compare traditional knowledge in different sectors. (L4)
English for job seekers	C220.1	Understand the grammatical forms of English and the use of these forms in specific communicative and career context (L2)
	C220.2	Use a wide range of reading comprehension strategies appropriate to texts, to retrieve information (L3)
	C220.3	Strengthen their ability to write paragraphs, essays, emails and summaries (L2)
	C220.4	Improve their speaking ability in English both in terms of fluency and comprehensibility by participating in Group discussion and oral assignments (L3)
	C220.5	Prepare their own resume and answer interview related questions unhesitatingly with acceptable soft skills (L3)
Power Systems-II	C301.1	Distinguish different types of insulators and Analyze the phenomenon of corona (L2)
	C301.2	Calculate sag of transmission line or equal and unequal heights of towers (L3)
	C301.3	Analyze different types of transients in power systems (L4)

Subject Name	NBA Code	Course Outcomes
	C301.4	Analyze the construction, types and grading of underground cables (L4)
	C301.5	Analyze the various factors associated with power distribution (L4)
Power Electronics	C302.1	Analyze the characteristics of power semiconductor devices and the processes of Turn-on and Turn-off of semiconductor switches (L4)
	C302.2	Examine the controlled rectifier circuits with different Loads (L4)
	C302.3	Demonstrate DC-to-DC chopper circuits for different range of applications (L2)
	C302.4	Analyze AC-AC converters for diverse industrial and renewable energy applications (L4)
	C302.5	Demonstrate the operation of single and three phase voltage source inverters and control schemes(L2)
Internet of Things	C305.1	Illustrate the architecture and principles in Internet of Things. (L2)
	C305.2	Outline the Arduino platform and its applications. (L2)
	C305.3	Develop applications using Raspberry Pi. (L3)
	C305.4	Select protocols for a specific IoT application. (L2)
	C305.5	Utilize the cloud platform and APIs for IoT application. (L3)
Python Programming	C306.1	Understand the basic fundamentals of scripting language and its learning environment (L2)
	C306.2	Acquire the knowledge of data types, operators and control structures (L2)
	C306.3	Apply the concept of modularity and implement different packages to solve complex problems (L3)
	C306.4	Apply the concepts of data structures to real world data (L3)
	C306.5	Understand Object oriented concepts and handle different errors through exceptions (L2)
Digital Control Systems	C307.1	Understand the concepts of digital control systems. (L2)
	C307.2	Understand z–transformations and mathematical analysis of digital control systems(L2)
	C307.3	Understand the concept of state–space analysis(L2)
	C307.4	Analyze the stability of the digital control systems(L4)
	C307.5	Analyze digital control systems in the w–plane and the design of state feedback controller. (L4)
Electrical Machine Design	C308.1	Understand the various factors influence the design of electrical machines. (L2)
	C308.2	Design the armature, commutator and brushes of DC machines. (L3)

Subject Name	NBA Code	Course Outcomes
	C308.3	Design the core, yoke, windings of transformers and also deign the rotor bars & slots and end rings of Induction motor. (L3)
	C308.4	Design the field winding, damper winding and rotor of synchronous machines. (L3)
	C308.5	Use the software tools to design the calculation. (L3)
Data Structures	C310.1	Analyze different searching and sorting Techniques(L4)
	C310.2	Apply the concepts of stacks and queues in real time applications(L3)
	C310.3	Analyze concepts of linked lists and with their implementation of different Linked Lists(L4)
	C310.4	Analyze the nonlinear data structures trees and their operations(L4)
	C310.5	Evaluating concepts of graphs and their applications(L3)
Electrical Machines-II Lab	C311.1	Analyze the performance characteristics of AC machines by Effective Collaboration in teams (L4)
	C311.2	Apply speed control techniques on various AC machines that are required for project designs (L3)
	C311.3	Estimate how much reactive power is reduced by capacitor banks in order to abide by environmental requirements (L5)
	C311.4	Determine the voltage regulation using specific methods are applied in industrial alternators (L3)
	C311.5	Estimate the reliable data by Conducting tests accurately for AC motor performance evaluation by Prioritizing safety protocols (L5)
Control Systems Lab	C312.1	Design and simulation of Time Response Analysis of Second Order Systems (L3)
	C312.2	Analyze the Characteristics of Synchro's, AC & DC Motors and Magnetic Amplifiers (L4)
	C312.3	Design of P, PI & PID controller for a Second Order System (L3)
	C312.4	Explain the frequency response characteristics of Lead and Lag Compensators And Test The Performance of DC servo motor using position control (L4)
	C312.5	Derive the Transfer Function of DC motor (L2)
Electrical Measurements and Instrumentation Lab	C313.1	Understand the testing of transformer oil (L2)
	C313.2	Apply suitable method for measuring R, L and C parameters in an electric network (L3)

Subject Name	NBA Code	Course Outcomes
	C313.3	Analyze the calibration of various instruments (L4)
	C313.4	Demonstrate the measurement of frequency and phase difference by using CRO (L2)
	C313.5	Measure various non-electrical parameters using transducers (L5)
Data Structures Lab	C314.1	Implement recursion function, sorting and searching techniques. (L3)
	C314.2	Implement various operations such as insertion, deletion and searching using Hashing table, BST, Circular Queues ,Binary search and Heaps(L3)
	C314.3	Investigate how the graph algorithms plays major role in Computer networks and effectively finding the efficient path using BFS and DFS(L4)
	C314.4	Design a solution for finding out MST using Prims and Kruskal algorithms. (L3)
	C314.5	Design a solution to find Shortest path between Single source to destination nodes in Network using Dijkstra algorithm(L3)
Entrepreneurship and Incubation	C315.1	Enriches the knowledge of Entrepreneurial behavior, and skill development (L3)
	C315.2	Initiate business ideas that have value in the end-market (L2)
	C315.3	Identify the validity of the idea and its unique selling proposition (L3)
	C315.4	Comprehend opportunity and challenges of-start up (L4)
	C315.5	Analyze various Government and non-Government financial resources (L4)
Engineering Exploration Project Design Thinking	C316.1	Identify and analyze social issues (L4)
	C316.2	Design and develop sustainable solutions (L3)
	C316.3	Apply Project Management skills and engage with communities. (L3)
	C316.4	Demonstrate technical and creative competence. (L2)
	C316.5	Evaluate social and environmental impact (L5)
Summer Internship-1	317.1	Construct the company profile by compiling the brief history, management structure, product/services offered, key achievements and market performance of internship organization. (L3)
	317.2	Determine the challenges and future potential of internship organization in particular and the sector in general. (L5)
	317.3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during

Subject Name	NBA Code	Course Outcomes
		the internship period. (L4)
	317.4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization. (L3)
	317.5	Analyze the functioning of internship organization to assess its Strengths, Weaknesses, Opportunities and Threats (SWOT) and recommend changes for improvement in processes. (L4)
Electric Drives	C318.1	Analyze the key characteristics of DC motors and explore various electric braking methods used to enhance performance and control (L4)
	C318.2	Analyze the methods for controlling the speed of DC motors through the application of chopper circuits. (L4)
	C318.3	Analyze the process for speed control of DC motors in four quadrants. (L4)
	C318.4	Analyze the characteristics of an Induction Motor from the fundamental equations. (L4)
	C318.5	Analyze the speed control techniques for squirrel cage and slip ring induction motors by regulating stator and rotor parameters. (L4)
Power System Analysis	C319.1	Apply mathematical knowledge of per-unit quantities and Y-bus matrix formation to power system components (L3)
	C319.2	Analyze Gauss seidel method, Newton Raphson method, Decoupled and Fast decoupled methods to solve power problems in Power Systems (L4)
	C319.3	Apply Z_{bus} formulation for symmetrical fault analysis in power systems (L3)
	C319.4	Analyze the power system under different unsymmetrical fault conditions (L4)
	C319.5	Interpret stability concepts and various methods to enhance the stability of a power system (L2)
Microprocessors and Microcontrollers	C320.1	Distinguish between microprocessors & microcontrollers (L4)
	C320.2	Develop assembly language programming Using assembler directives (L3)
	C320.3	Extend the working of 8-bit 8085 microprocessor to 16-bit 8086 microprocessor with its architectural features. (L2)
	C320.4	Develop programming and interfacing of various peripheral devices to 8086 with support of ICs 8255, 8259, 8257 and 8251. (L3)
	C320.5	Utilize the architecture functions of 8051 with understanding of memory, parallel ports, serial

Subject Name	NBA Code	Course Outcomes
		ports, timers and interrupts for simple application programs. (L3)
Switchgear and Protection	C321.1	Examine the technical aspects involved in the operation of different circuit breakers (L4)
	C321.2	Describe The Principles of operation and applications of protective relays in electrical systems (L2)
	C321.3	Analyze the protection techniques to assess their effectiveness in safeguarding generators and transformers from faults and abnormal conditions (L4)
	C321.4	Analyze the generator and transformer protection schemes under different fault conditions (L4)
	C321.5	Analyze the static relays and neutral grounding methods for effective system protection against faults and over voltages (L4)
Advanced Control Systems	C322.1	Develop the State space representation of control system and formulation of different state models(L3)
	C322.2	Apply the pole placement technique to design the various control systems(L3)
	C322.3	Analyze nonlinear systems using the describing function technique and phase plane analysis(L4)
	C322.4	Examine the stability of nonlinear systems using Lyapunov's method(L4)
	C322.5	Apply the concepts of Fuzzy Logic control and Neural Networks to various nonlinear controllers(L3)
Special Electrical Machines	C324.1	Understand the basic properties of permanent magnet materials used in electrical machines (L2)
	C324.2	Analyse the performance and control circuits of a stepper motor. (L4)
	C324.3	Analyze the performance and Different converter configurations used in switched reluctance motors. (L4)
	C324.4	Analyse the performance of Brushless DC Motors and Permanents Magnet Synchronous Motors. (L4)
	C324.5	Understand the construction and operation of various types of linear induction motors. (L2)
Data Base Management System	C327.1	Apply the concepts and design database schema for given information system(L3)
	C327.2	Develop querying and analyzing skills in SQL, PL/SQL. (L3)
	C327.3	Remove anomalies in schema through different inference rules. (L3)

Subject Name	NBA Code	Course Outcomes
	C327.4	Analyze transactional data bases using ACID properties. (L4)
	C327.5	Understand the way of Organizing the data through different efficient storage techniques(L2)
Power Electronics Lab	C330.1	Discuss the characteristics of various power electronic devices (L2)
	C330.2	Analyze the performance of single–phase bridge converters, Dual Converters and Cyclo converters (L4)
	C330.3	Design the Buck converter and Boost converter (L3)
	C330.4	Develop the single phase and three phase AC voltage regulator (L3)
	C330.5	Understand single–phase square wave inverter with PWM technique (L2)
Microprocessors & Microcontrollers Lab	C331.1	Develop programming skills for data operations and different interfacing circuits of microprocessor and microcontrollers(L3)
	C331.2	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(L3)
	C331.3	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(L4)
	C331.4	Demonstrate the process of interfacing 8086 microprocessor with peripheral control ICs like 8255 and 8259.(L2)
	C331.5	Develop assembly language programs to make use of parallel ports, timers and serial port of 8051 microcontroller(L3)
Electrical Engineering Virtual Lab	C332.1	Analyze Basic Network Theorems(L4)
	C332.2	Analyze the performance and characteristics of DC Machine & Transformer(L4)
	C332.3	Obtain Equivalent circuit parameters of Induction Motor (L3)
	C332.4	Control the Speed of Induction Motor(L3)
	C332.5	Develop the V & Inverted V Curves of Three Phase Synchronous Motor(L3)
Introduction to MATLAB	C333.1	Understand the MATLAB environment and its applications (L2)
	C333.2	Analyze the Data and Data Flow in MATLAB (L4)
	C333.3	Apply the Conditional Statements and Loops to given applications (L3)

Subject Name	NBA Code	Course Outcomes
	C333.4	Develop programs to solve system of linear equations (L3)
	C333.5	Design Simulink Model based on the mathematical modelling and electric circuit theorems (L6)
Power System Operation and Control	C401.1	Apply the operating principles of economic scheduling to minimize the overall cost of generation(L3)
	C401.2	Analyze the optimal allocation of hydro-thermal system and unit commitment schedules to ensure optimal operation(L4)
	C401.3	Apply the concepts to develop mathematical models for load frequency control in power systems(L3)
	C401.4	Examine the Economic dispatch control and load frequency control in two area systems(L4)
	C401.5	Describe the methods for reactive power control and its importance in maintaining system stability(L2)
Utilization of Electrical Energy	C402.1	Describe the suitable motor for electric drives and their various industrial applications. (L2)
	C402.2	Apply the concepts of illumination to Calculate the illumination levels required for various lighting schemes(L3)
	C402.3	Explain the appropriate heating and welding techniques for different applications. (L2)
	C402.4	Apply the concepts of D.C and A.C traction systems(L3)
	C402.5	Apply speed-time curves and the energy consumption of different services under various operating conditions(L3)
Electrical Distribution Systems	C403.1	Explain the various factors effecting the distribution system(L2)
	C403.2	Classify distribution feeders and the benefits of optimal location of substations(L4)
	C403.3	Apply the different techniques to calculate the voltage drop and power loss across for different load areas in a power distribution system(L3)
	C403.4	Analyze the various protection schemes and their coordination Procedure(L4)
	C403.5	Analyze the effect of compensation on P.F improvement(L4)
Hybrid Electric Vehicles	C405.1	Outline key concepts of vehicle fundamentals, propulsion loads, electric and hybrid vehicle technologies, and relevant motor systems. (L2)
	C405.2	Illustrate the architectures and components of Hybrid Electric Vehicles (HEVs), Plug-in

Subject Name	NBA Code	Course Outcomes
		Hybrid Electric Vehicles (PHEVs), and fuel cell vehicles. (L2)
	C405.3	Demonstrate the PHEV architectures, power management, battery charging, and how PHEVs interact with electric power grid through vehicle to grid and grid to vehicle technologies. (L2)
	C405.4	Analyze the power converters used in hybrid electric vehicles (L4)
	C405.5	Identify appropriate energy storage mechanism used in hybrid electric vehicles (L4)
Energy Conservation and Auditing	C406.1	Analyze the significance of energy conservation and security(L4)
	C406.2	Apply the principles and techniques of energy auditing to assess energy consumption in industrial and commercial systems. (L3)
	C406.3	Make use of audit instruments for energy audit and management(L3)
	C406.4	Analyze the performance of electrical utilities and their efficient improvement approaches. (L4)
	C406.5	Analyze the life cycle cost and return on investment of energy-efficient technologies. (L4)
Power Quality	C409.1	Identify the sources and effects of power quality problems. (L2)
	C409.2	Apply the concept of compensation for sags ,swells using Voltage regulating devices(L3)
	C409.3	Explain the principle of voltage regulation and power factor improvement methods. (L2)
	C409.4	Analyse voltage distortion, current distortion and their indices(L4)
	C409.5	Explain power quality measurement data according to standards. (L2)
AI Techniques and Applications in Electrical Engineering	C410.1	Understand how the soft computing techniques can be used for solving the problems of power systems operation and control(L2)
	C410.2	Design of ANN based systems for function approximation used in load forecasting(L3)
	C410.3	Design of Fuzzy based systems for load frequency control in power systems(L3)
	C410.4	Solve problem of Optimization in power systems(L3)
	C410.5	Apply GA to power system optimization problems(L3)
Power Systems & Simulation Lab	C411.1	Determine the Sequence Impedance of Alternator and Transformer (L5)
	C411.2	Determine the Transmission Line Parameters and study the Ferranti Effect (L5)
	C411.3	Design & Simulation of Load Frequency Controllers and Load Flow Studies of Power System Network (L3)

Subject Name	NBA Code	Course Outcomes
	C411.4	Simulation of Transient Response of RLC circuits (L3)
	C411.5	Simulation of Single Phase Full Converter & Voltage Controller (L3)
Mini Project	C412.1	Apply electrical engineering concepts to analyze ideas and develop physical or simulation models (L3)
	C412.2	Demonstrate the ability to work independently and collaboratively in diverse teams (L2)
	C412.3	Evaluate recent advancements in electrical and electronics engineering through a critical literature review and assess the implementation of innovative ideas using modern tools (L5)
	C412.4	Develop models that contribute to society while adhering to research ethics and professional values (L6)
	C412.5	Improve writing and presentation skills to effectively communicate research work and facilitate publication (L6)
PLC and SCADA	C413.1	Understand the Basics of Programmable Logic Controllers (L2)
	C413.2	Understand different timers and Counters in PLC (L2)
	C413.3	Develop the logic for starting and running of motor in PLC (L3)
	C413.4	Apply the knowledge to control the conveyor belt and traffic light system in PLC (L3)
	C413.5	Understand the SCADA System for industrial Environment(L2)
Electrical Installation and Estimation	C414.1	Apply the knowledge of Estimation and costing for real time installations(L3)
	C414.2	Describe the use of different types of wiring for residential and commercial(L2)
	C414.3	Analyze the condition and Test various electrical equipments(L4)
	C414.4	Design and estimate the installations of various industrial equipments(L3)
	C414.5	Design and estimate the cost for Transmission and distribution lines(L3)
Summer Internship-2	C416.1	Construct the company profile by compiling the brief history, management structure, product/services offered, key achievements and market performance of internship organization. (L3)
	C416.2	Determine the challenges and future potential of internship organization in particular and the sector in general. (L5)
	C416.3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period. (L4)

Subject Name	NBA Code	Course Outcomes
	C416.4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization. (L3)
	C416.5	Analyze the functioning of internship organization to assess its Strengths, Weaknesses, Opportunities and Threats (SWOT) and recommend changes for improvement in processes. (L4)
Renewable Energy Systems	C416.1	Understand the basic concepts of solar radiation, its data on earth's surface(L2)
	C416.2	Explain the different types of solar thermal energy collectors(L2)
	C416.3	Develop the maximum power point techniques in solar Photovoltaic Systems(L3)
	C416.4	Understand the Wind energy conversion systems and the various geothermal resources(L2)
	C416.5	Explain the methods of generation of electricity from tidal and chemical resources(L2)
Neural Network and Fuzzy Logic	C418.1	Explain Basic Concepts of ANN(L2)
	C418.2	Explain the Architecture of Neural Networks Models(L2)
	C418.3	Identify and describe Fuzzy Logic and Artificial Neural Network techniques in building intelligent machines(L2)
	C418.4	Apply Artificial Neural Network & Fuzzy Logic models to handle uncertainty and solve engineering problems(L3)
	C418.5	Analyze the one-dimensional fuzzy optimization techniques and their applications in solving complex problems. (L4)
VLSI Design	C419.1	Introduce the various steps involved in the MOS transistor fabrication of integrated circuits(L2)
	C419.2	Explain the electrical properties of MOS devices(L2)
	C419.3	Introduce design rules and scaling effects in CMOS technology(L2)
	C419.4	Observe the behavior of inverters designed with various loads(L2)
	C419.5	Provide an overview of testing fundamentals and its testability design(L2)
Power System Reforms	C422.1	Explain different restructuring models, including the roles of Independent System Operators (ISO) and Power Exchanges in a restructured power system. (L2)
	C422.2	Apply methodologies to calculate transfer capabilities and reliability margins using the Open Access Same-Time Information System (OASIS). (L3)
	C422.3	Analyze electricity price volatility and forecasting methods to address challenges in electricity

Subject Name	NBA Code	Course Outcomes
		pricing. (L4)
	C422.4	Apply operational planning activities for strategic operation of Gencos in pool and bilateral markets. (L3)
	C422.5	Recognize the significance of synchronous generators in providing reactive power as an ancillary service within power systems. (L2)
HVDC and FACTS	C423.1	Apply HVDC technology to design and implement HVDC transmission links for long-distance power transfer. (L3)
	C423.2	Analyze various control strategies for HVDC systems(L4)
	C423.3	Explain the fundamental principles of FACTS, including their purpose and importance in modern power systems. (L2)
	C423.4	Analyze the operational principles and performance characteristics of static shunt compensators and series compensators(L4)
	C423.5	Analyze the principles and functionalities of combined compensators(L4)
Project	C425.1	Apply electrical engineering concepts to analyze ideas and develop physical or simulation models (L3)
	C425.2	Demonstrate the ability to work independently and collaboratively in diverse teams (L2)
	C425.3	Evaluate recent advancements in electrical and electronics engineering through a critical literature review and assess the implementation of innovative ideas using modern tools (L5)
	C425.4	Develop models that contribute to society while adhering to research ethics and professional values (L6)
	C425.5	Improve writing and presentation skills to effectively communicate research work and facilitate publication (L6)