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)
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Department of Electrical and Electronics Engineering

Course Outcomes (COs) of all Courses

2020-2024 Batch

Subject Name	NBA Code	Course Outcomes
Communicative 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. Enhance pronunciation with befitting tone for clarity in a speech to communicate language effectively.(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. Participate in short conversations in routine contexts on topics of interest and ask questions and make requests politely. (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. Listen for specific information, gist, note-taking, note-making and comprehension and develop convincing and negotiating skills through debates. (L2)
	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 summarising Gain reading skills for comprehension, specific information, gist, and pleasure through extensive reading. (L2)

Numerical Method and Ordinary Differential Equations	C102.1	Apply numerical methods and implement interpolation techniques to solve real-world problems in engineering. (L3)
	C102.2	Apply numerical methods to solve ordinary differential equations that arise in various engineering fields. (L3)
	C102.3	Apply the first order ordinary differential equations to solve various engineering problems. (L3)
	C102.4	Apply the higher order ordinary differential equations to solve various engineering problems. (L3)
	C102.5	Apply the Laplace transform to solve differential equations and integral equations that arise in various engineering fields. (L3)
Engineering Chemistry	C103.1	Distinguish thermoplastics and thermosetting plastics. (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	Compare the working principle and materials used in Floppy, CD and pen drive & explain the applications of semiconductors and superconductors.(L2)
	C103.5	Illustrate the preparation, properties and applications of Nano materials and importance of liquid crystals.(L2)
Computer Programming in 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 pointers (L3)
	C104.4	Apply the knowledge of strings and functions in programming(L3)
	C104.5	Comprehend structures and unions (L3)
Engineering Drawing	C105.1	Apply the basics of engineering drawing to construct the polygons, curves and orthographic projections of points. (L3)
	C105.2	Depict the orthographic projections of straight lines in various orientations relative to reference planes. (L3)
	C105.3	Draw the projections of regular planes in various orientations relative to the reference planes. (L3)
	C105.4	Construct the projections of various solids, including polyhedral and solids of revolution, in different orientations relative to the reference planes. (L3)

	C105.5	Convert isometric views into orthographic views, and vice versa.(L3)
Engineering Chemistry Lab	C106.1	Explain the functioning of the instruments such as Conductivity and pH meters.(L2)
	C106.2	Interpret the graphical values to analyze the experimental results.(L2)
	C106.3	Determine the concentrations of Acid, Zinc and Copper.(L3)
	C106.4	Prepare polymers and nano-materials.(L2)
	C106.5	Identify the safety precautions to carry out the experiments in the laboratory using chemicals.(L3)
Computer Programming in C Lab	C107.1	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. (L2)
	C107.2	Understand C programming development environment and also how to compiling, debugging, and linking a Program using C Language.(L2)
	C107.3	Apply arrays, strings concepts to solve problems. (L3)
	C107.4	Understand and apply the in-built functions and customized functions for solving the problems.(L2)
	C107.5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.(L2)
Electrical Engineering Workshop	C108.1	Explain the limitations, tolerances, Safety aspects of electrical systems and wiring.(L2)
	C108.2	Select wires/cables and other accessories used in different types of wiring.(L1)
	C108.3	Make simple lighting and power circuits.(L3)
	C108.4	Measure current, voltage and power in a circuit.(L2)
	C108.5	Apply starting methods to AC and DC Machines. (L3)
Linear Algebra and Multivariable Calculus	C109.1	Apply the matrix algebra techniques to engineering applications.(L3)
	C109.2	Apply the concepts of Eigen values and Eigen vectors to free vibration of a two mass system. (L3)
	C109.3	Apply partial differentiation to find maxima and minima of functions of several variables (L3)
	C109.4	Evaluate the volume and surface area of solids using multiple integrals. (L2)
	C109.5	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	C110.1	Apply mean value theorems to real world problems.(L3)

	C110.2	Apply Z-transforms to solve various engineering problems(L3)
	C110.3	Apply Fourier series to practical harmonic Analysis(L3)
	C110.4	Evaluate Fourier transform of a function. (L2)
	C110.5	Apply the partial differential equations to solve various engineering problems. (L3)
Applied Physics	C111.1	Interpret the interaction of optic energy with matter on the basis of interference (L2)
	C111.2	Apply the principles of diffraction to the electrical and electronics engineering systems (L2)
	C111.3	Enumerate the properties of polarization & Lasers and (L2)
	C111.4	Describe the fundamentals of Fiber Optics &semiconductors (L2)
	C111.5	Analyze the problems of digital electronics to electrical and electronics engineering systems (L2)
Electrical Circuit Analysis 1	C112.1	Understands V-I relationships of basic circuit elements and network reduction techniques. (L2)
	C112.2	Determine of co-efficient of coupling for a given magnetic circuit. (L2)
	C112.3	Analyses single phase ac circuits and understands concepts of phase and power factor.(L4)
	C112.4	Extends knowledge of dc analysis to ac circuits and determines selectivity of a RLC resonant circuit.(L2)
	C112.5	Simplify complex electrical networks by using various network theorems.(L3)
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	Apply thermodynamic principles to analyze gas turbine efficiency and performance.(L3)
	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)
Communicative English Lab	C114.1	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.(L2)
	C114.2	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.(L3)
	C114.3	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. (L2)
	C114.4	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.(L2)
	C114.5	Develop advanced listening skills for 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. (L3)
Applied Physics Lab	C115.1	Apply the working principles of laboratory experiments in optics, electrical and electronics. (L3)
	C115.2	Compute the required parameter by suitable formula using experimental values (observed values) in optics, electrical and electronic experiments. (L2)
	C115.3	Analyze the experimental results through graphical interpretation. (L4)
	C115.4	Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory.(L2)
	C115.5	Demonstrate the working principles, procedures and applications. (L2)
Engineering Workshop & IT Workshop Lab	C116.1	Apply wood working skills in real world applications. (L3)
	C116.2	Build different parts with fitting in engineering applications. (L3)
	C116.3	Develop various basic prototypes in black smith & tiny smith applications. (L3)
	C116.4	Apply different types of basic electric circuit connections. (L3)
	C116.5	Understand the basic components, peripherals and basic operations of a computer. (L3)
Environmental Science	C117.1	Understand about the environment and natural resources. (L2)
	C117.2	Understands about various attributes of different types of pollution and their impacts on the environment and control methods along with waste management practices. (L2)
	C117.3	Illustrate about the ecosystem and knows the importance of conservation of biodiversity. (L2)
	C117.4	Relate the current environmental impacts with the societal problems.(L2)
	C117.5	Identify the current population explosion and their impacts environment.(L3)

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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)
	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)

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	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)
Electronic Circuits & PSpice Lab	C206.1	Analyze the V-I characteristics of PN junction and Zener Diodes (L4)
	C206.2	Evaluate the performance metrics of Half wave and Full wave rectifiers with filters (L5)
	C206.3	Sketch the response of linear and non linear wave shaping circuits (L2)
	C206.4	Analyze the input and output V-I characteristics of Transistors and JFETs (L4)
	C206.5	Plot the frequency response of BJT and FET amplifiers (L2)
Electrical Circuits Lab	C207.1	Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagram (L2)
	C207.2	Apply various theorems to compare practical results obtained with theoretical calculations (L3)
	C207.3	Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.
	C207.4	Analyze different circuit characteristics with the help of fundamental laws and various configurations (L4)
	C207.5	Analyze the two port networks (L4)
Thermal and Hydro Prime Movers Lab	C208.1	Analyse the valve and port timing diagrams of I.C. engines for both 2-stroke and 4-stroke engines(L4)
	C208.2	Analyse the performance parameters for both 4-stroke diesel and 2-stroke engines (L4)
	C208.3	Calculate the Engine Friction and Power Losses by conducting Morse test, retardation test, and motoring test (L3)
	C208.4	Understand the Heat Balance in I.C. Engines (L3)
	C208.5	Evaluate the performance of hydraulic machines such as Pelton wheels, Francis turbines, and

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		centrifugal pumps (L5)
Introduction to MATLAB	C209.1	Understand the MATLAB environment and its applications (L2)
	C209.2	Analyze the Data and Data Flow in MATLAB (L4)
	C209.3	Apply the Conditional Statements and Loops to given applications (L3)
	C209.4	Develop programs to solve system of linear equations (L3)
	C209.5	Design Simulink Model based on the mathematical modelling (L6)
Essence of Indian Traditional Knowledge	C210.1	Compare physical and social contexts of traditional knowledge (L2)
	C210.2	Interpret the role of government in harnessing (To protect natural resources) Traditional Knowledge (L2)
	C210.3	Analyze plant variant protections and evaluate farmers right act (L4)
	C210.4	Evaluate strategies to increase the protection of traditional knowledge and Intellectual Property Rights. (L3)
	C210.5	Compare traditional knowledge in different sectors. (L4)
Community Service Project	C211.1	Creating interest in new avenues for research and publication via new relationships between faculty and community through self-learning
	C211.2	Providing networking opportunities with engaged faculty in other disciplines or institutions
	C211.3	Creating stronger commitment to one's research work.
	C211.4	Enhancing community relations through Valuable human resources needed to achieve community goals
	C211.5	Crating new energy, enthusiasm and perspectives applied to community work
Power System-I	C212.1	Explain the working principle of thermal power plant(L2)
	C212.2	Explain the working principle of nuclear power plant(L2)
	C212.3	Compare air insulated substations and gas insulated substations(L2)
	C212.4	Identify single core and three core cables with different insulating materials (L3)
	C212.5	Analyze the different economic factors of power generation and tariffs (L4)
Electrical Machines-II	C213.1	Examine the operating principles and performance characteristics of three-phase induction motors (L4)

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	C213.2	Analyze the speed control methods, testing procedures, and performance characteristics of three-phase induction motors (L4)
	C213.3	Analyze the performance and synchronization of a synchronous generator (L4)
	C213.4	Analyze the performance characteristics of a synchronous motor (L4)
	C213.5	Explain the principle of operation of single-phase induction motors (L2)
Digital Electronics	C214.1	Understand different number systems, arithmetic operations on binary numbers, complements, and Error correcting and detecting codes (L2)
	C214.2	Apply Boolean laws, k-map & Q-M methods to minimize switching functions (L3)
	C214.3	Develop different combinational logic circuits such as Adders, Sub tractors, Comparators, Encoders, Decoders, Multiplexers and De-multiplexers (L3)
	C214.4	Develop various synchronous and asynchronous sequential logic circuits using Flip-Flops (L3)
	C214.5	Develop different types of Programmable Logic Devices and realize functions using PLDs (L3)
Control Systems	C215.1	Develop the transfer function of physical systems using block diagram algebra and signal flow graphs (L3)
	C215.2	Apply the concepts of time response analysis on first and second order systems (L3)
	C215.3	Analyze the absolute stability and relative stability of control system by RH criterion and root locus techniques (L4)
	C215.4	Apply various frequency domain techniques to assess the system performance and stability (L3)
	C215.5	Analyze State space models of linear time invariant systems (L4)
Managerial Economics & Financial Analysis	C216.1	Analyze macro, micro economic concepts useful for business units and determine influences of demand and supply analysis (L4)
	C216.2	Understand the production functions , types of costs and solving engineering problems by applying knowledge of economics (L2)
	C216.3	Analyze the consciousness about market structures and pricing methods of industries. Identify suitable form of business and understand different stages of business cycle (L4)
	C216.4	Comprehend financial accounting process and Evaluation of financial statements (L4)
	C216.5	Interpretation of financing methods, their applicability in decision making and problem-solving

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		skills according to new trends (L4)
Electrical Machines-I Lab	C217.1	Analyze the principles and operational characteristics of DC Generators (L4)
	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)
Electrical Machines-II Lab	C218.1	Analyze the performance characteristics of AC machines by Effective Collaboration in teams (L4)
	C218.2	Apply speed control techniques on various AC machines that are required for project designs (L3)
	C218.3	Estimate how much reactive power is reduced by capacitor banks in order to abide by environmental requirements (L5)
	C218.4	Determine the voltage regulation using specific methods are applied in industrial alternators (L3)
	C218.5	Estimate the reliable data by Conducting tests accurately for AC motor performance evaluation by Prioritizing safety protocols (L5)
Control Systems Lab	C219.1	Design and simulation of Time Response Analysis of Second Order Systems (L3)
	C219.2	Analyze the Characteristics of Synchro's, AC & DC Motors and Magnetic Amplifiers (L4)
	C219.3	Design of P, PI & PID controller for a Second Order System (L3)
	C219.4	Explain the frequency response characteristics of Lead and Lag Compensators And Test The Performance of DC servo motor using position control (L4)
	C219.5	Derive the Transfer Function of DC motor (L2)
Programmable Logic Control	C220.1	Explain the basic logic gates using a programmable logic controller (PLC). (L2)
	C220.2	Design and classify different timers and Counters in programmable logic controller (PLC). (L3)
	C220.3	Design and implement DOL, Star-Delta starters & control of three-phase induction motors using PLC for efficient motor control. (L3)
	C220.4	Develop automated systems like conveyor belts, staircases, and lift controls using PLC programming techniques. (L3)

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	C220.5	Develop real-world PLC applications like traffic signal control, alarm systems, and tank level monitoring. (L3)
English for Competitive Exams	C221.1	Identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion. (L2)
	C221.2	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)
	C221.3	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)
	C221.4	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)
	C221.5	Realise the technical communicative competence and attainment of grammatically correct structures for formal communication (L2)
Power Systems-II	C301.1	Apply the concept of GMR and GMD of symmetrical and unsymmetrical networks (L3)
	C301.2	Examine the performance of different transmission lines (L4)
	C301.3	Classify the transients and Termination of lines under various conditions in power systems (L4)
	C301.4	Apply the various factors that govern the performance of transmission lines (L3)
	C301.5	Analyze the sag and tension in transmission lines, considering factors such as conductor properties, environmental conditions, and span length (L4)
Electrical Measurements and Instrumentation	C302.1	Choose the right type of instrument for measurement of voltage and current for AC and DC circuits (L2)
	C302.2	Explain the principle of operation and working of different types of instruments (L2)
	C302.3	Apply principles of potentiometer to calibrate ammeters, voltmeters, and wattmeters accurately (L3)
	C302.4	Analyze the performance of AC and DC bridges for measuring electrical parameters (L4)

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	C302.5	Analyze the performance of different types of digital meters in measuring electrical quantities (L4)
Power Electronics	C303.1	Analyze the characteristics of power semiconductor devices and the processes of Turn-on and Turn-off of semiconductor switches (L4)
	C303.2	Examine the controlled rectifier circuits with different Loads (L4)
	C303.3	Demonstrate DC-to-DC chopper circuits for different range of applications (L2)
	C303.4	Analyze AC-AC converters for diverse industrial and renewable energy applications (L4)
	C303.5	Demonstrate the operation of single and three phase voltage source inverters and control schemes(L2)
Python Programming	C307.1	Understand the basic fundamentals of scripting language and its learning environment (L2)
	C307.2	Acquire the knowledge of data types, operators and control structures (L2)
	C307.3	Apply the concept of modularity and implement different packages to solve complex problems (L3)
	C307.4	Apply the concepts of data structures to real world data (L3)
	C307.5	Understand Object oriented concepts and handle different errors through exceptions (L2)
Signals and Systems	C308.1	Analyze the signal characteristics, operations on signals, system properties, and Fourier series applications (L4)
	C308.2	Apply Fourier transforms for spectral analysis and the sampling theorem for signal reconstruction (L3)
	C308.3	Analyze linear time-invariant systems using convolution and correlation concepts (L4)
	C308.4	Analyze continuous-time signals using Laplace transform to obtain their pole-zero plot with ROC and characterize LTI systems (L4)
	C308.5	Analyze discrete-time signals using Z-transform to obtain their pole-zero plot with ROC and LTI system characterization (L4)
Electrical Measurements and Instrumentation Lab	C312.1	Analyze the testing of transformer oil (L4)
	C312.2	Apply suitable method for measuring R, L and C parameters in an electric network(L3)
	C312.3	Analyze the calibration of various instruments(L4)
	C312.4	Demonstrate the measurement of frequency and phase difference by using CRO(L2)
	C312.5	Analyze the measurement of various electrical and non-electrical parameters using appropriate measuring instruments(L4)

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Power Electronics Lab	C313.1	Discuss the characteristics of various power electronic devices (L2)
	C313.2	Analyze the performance of single–phase bridge converters, Dual Converters and Cyclo converters (L4)
	C313.3	Design the Buck converter and Boost converter (L3)
	C313.4	Develop the single phase and three phase AC voltage regulator (L3)
	C313.5	Understand single–phase square wave inverter with PWM technique (L2)
Soft skills for job seekers	C314.1	Understand the grammatical forms of English and the use of these forms in specific communicative and career context (L2)
	C314.2	Use a wide range of reading comprehension strategies appropriate to texts, to retrieve information (L3)
	C314.3	Strengthen their ability to write paragraphs, essays, emails and summaries (L2)
	C314.4	Improve their speaking ability in English both in terms of fluency and comprehensibility by participating in Group discussion and oral assignments (L3)
	C314.5	Prepare their own resume and answer interview related questions unhesitatingly with acceptable soft skills (L3)
Summer Internship-I	C315.1	Construct the company profile by compiling the brief history, management structure, product/services offered, key achievements and market performance of internship organization. (L3)
	C315.2	Determine the challenges and future potential of internship organization in particular and the sector in general. (L5)
	C315.3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period. (L4)
	C315.4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization. (L3)
	C315.5	Analyze the functioning of internship organization to assess its Strengths, Weaknesses, Opportunities and Threats (SWOT) and recommend changes for improvement in processes. (L4)
Entrepreneurship and Incubation	C316.1	Enriches the knowledge of Entrepreneurial behavior, and skill development (L3)
	C316.2	Initiate business ideas that have value in the end-market (L2)
	C316.3	Identify the validity of the idea and its unique selling proposition (L3)
	C316.4	Comprehend opportunity and challenges of-start up (L4)

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	C316.5	Analyze various Government and non-Government financial resources (L4)
Power System Analysis	C317.1	Apply mathematical knowledge of per-unit quantities and Y-bus matrix formation to power system components (L3)
	C317.2	Analyze Gauss seidel method, Newton Raphson method, Decoupled and Fast decoupled methods to solve power problems in Power Systems (L4)
	C317.3	Apply Z_{bus} formulation for symmetrical fault analysis in power systems (L3)
	C317.4	Analyze the power system under different unsymmetrical fault conditions (L4)
	C317.5	Interpret stability concepts and various methods to enhance the stability of a power system (L2)
Switchgear and Protection	C318.1	Examine the technical aspects involved in the operation of different circuit breakers (L4)
	C318.2	Describe The Principles of operation and applications of protective relays in electrical systems (L2)
	C318.3	Analyze the protection techniques to assess their effectiveness in safeguarding generators and transformers from faults and abnormal conditions (L4)
	C318.4	Analyze the generator and transformer protection schemes under different fault conditions (L4)
	C318.5	Analyze the static relays and neutral grounding methods for effective system protection against faults and over voltages (L4)
Microprocessors and Microcontrollers	C319.1	Distinguish between microprocessors & microcontrollers (L4)
	C319.2	Develop assembly language programming Using assembler directives (L3)
	C319.3	Extend the working of 8-bit 8085 microprocessor to 16-bit 8086 microprocessor with its architectural features. (L2)
	C319.4	Develop programming and interfacing of various peripheral devices to 8086 with support of ICs 8255, 8259, 8257 and 8251. (L3)
	C319.5	Utilize the architecture functions of 8051 with understanding of memory, parallel ports, serial ports, timers and interrupts for simple application programs. (L3)
Advanced Control Systems	C320.1	Develop the State space representation of control system and formulation of different state models(L3)
	C320.2	Apply the pole placement technique to design the various control systems(L3)
	C320.3	Analyze nonlinear systems using the describing function technique and phase plane analysis(L4)

Subject Name	NBA Code	Course Outcomes
	C320.4	Examine the stability of nonlinear systems using Lyapunov's method(L4)
	C320.5	Apply the concepts of Fuzzy Logic control and Neural Networks to various nonlinear controllers(L3)
Electric Drives	C321.1	Analyze the performance characteristics of DC motors under diverse operating conditions to enhance their practical applications(L4)
	C321.2	Classify the approaches for regulating the speed of DC motors using controlled converter systems(L4)
	C321.3	Examine the process for speed control of DC motors in four quadrants(L4)
	C321.4	Analyze the mechanisms for speed control of induction motors through stator-side techniques(L4)
	C321.5	Analyze the mechanisms for speed control of induction motors through rotor-side techniques(L4)
Data Structures	C325.1	Analyze different searching and sorting Techniques(L4)
	C325.2	Analyze concepts of linked lists and with their implementation of different Linked Lists (L4)
	C325.3	Apply the concepts of stacks and queues in real time applications(L3)
	C325.4	Analyze the nonlinear data structures trees and their operations(L4)
	C325.5	Evaluating concepts of graphs and their applications(L3)
Data Base Management System	C326.1	Apply the concepts and design database schema for given information system(L3)
	C326.2	Develop querying and analyzing skills in SQL, PL/SQL. (L3)
	C326.3	Remove anomalies in schema through different inference rules. (L3)
	C326.4	Analyze transactional data bases using ACID properties. (L4)
	C326.5	Understand the way of Organizing the data through different efficient storage techniques(L2)
Power Systems and Simulation Lab	C328.1	Determine the Sequence Impedance of Alternator and Transformer (L5)
	C328.2	Determine the Transmission Line Parameters and study the Ferranti Effect(L3)
	C328.3	Design & Simulation of Load Frequency Controllers and Load Flow Studies of Power System

Subject Name	NBA Code	Course Outcomes
		Network (L3)
	C328.4	Simulation of Transient Response of RLC circuits (L3)
	C316.5	Simulation of Single Phase Full Converter & Voltage Controller (L3)
Electrical Engineering Virtual Lab	C329.1	Analyze Basic Network Theorems(L4)
	C329.2	Analyze the performance and characteristics of DC Machine & Transformer(L4)
	C329.3	Obtain Equivalent circuit parameters of Induction Motor (L3)
	C329.4	Control the Speed of Induction Motor(L3)
	C329.5	Develop the V & Inverted V Curves of Three Phase Synchronous Motor(L3)
Microprocessors and Microcontrollers Lab	C330.1	Develop programming skills for data operations and different interfacing circuits of microprocessor and microcontrollers(L3)
	C330.2	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)
	C330.3	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)
	C330.4	Demonstrate the process of interfacing 8086 microprocessor with peripheral control ICs like 8255 and 8259.(L2)
	C330.5	Develop assembly language programs to make use of parallel ports, timers and serial port of 8051 microcontroller(L3)
Electric Vehicle Technology	C331.1	Analyze the working principle of electrical vehicles, fundamentals of batteries and their designing characteristics(L4)
	C331.2	Analyze performance of power converters in electric vehicles(L3)

Subject Name	NBA Code	Course Outcomes
	C331.3	Analyze the state of charge and battery management system of Battery in electric vehicle(L4)
	C331.4	Analyze the speed control of motors used in electric vehicles. (L4)
	C331.5	Explain the bidirectional operation in electric vehicle chargers. (L2)
Constitution of India	C332.1	Understand the historical background of the constitution making and its importance for building a democratic India (L2)
	C332.2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary (L2)
	C332.3	Understand the value of the fundamental rights and duties for becoming a good citizen of India(L2)
	C332.4	Analyze the decentralization of power between central, state and local self-government(L4)
	C332.5	Apply the knowledge in strengthening the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy(L3)
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)
Renewable Energy Systems	C402.1	Explain the basic concepts of solar radiation, its data on earth's surface(L2)
	C402.2	Explain the different types of solar thermal energy collectors(L2)

Subject Name	NBA Code	Course Outcomes
	C402.3	Develop the maximum power point techniques in solar Photovoltaic Systems(L3)
	C402.4	Describe the Wind energy conversion systems and the various geothermal resources(L2)
	C402.5	Explain the methods of generation of electricity from tidal and chemical resources(L2)
Utilization of Electrical Energy	C406.1	Describe the suitable motor for electric drives and their various industrial applications. (L2)
	C406.2	Apply the concepts of illumination to Calculate the illumination levels required for various lighting schemes(L3)
	C406.3	Explain the appropriate heating and welding techniques for different applications. (L2)
	C406.4	Apply the concepts of D.C and A.C traction systems(L3)
	C406.5	Apply speed-time curves and the energy consumption of different services under various operating conditions(L3)
Energy Conservation, Auditing and Management	C408.1	Analyze the significance of energy conservation and security(L4)
	C408.2	Apply the principles and techniques of energy auditing to assess energy consumption in industrial and commercial systems(L3)
	C408.3	Make use of audit instruments for energy audit and management(L3)
	C408.4	Analyze the performance of electrical utilities and their efficient improvement approaches(L4)
	C408.5	Analyze the life cycle cost and return on investment of energy-efficient technologies(L4)
Electrical Distribution Systems	C410.1	Explain the various factors effecting the distribution system(L2)
	C410.2	Classify distribution feeders and the benefits of optimal location of substations(L4)
	C410.3	Apply the different techniques to calculate the voltage drop and power loss across for different load areas in a power distribution system(L3)
	C410.4	Analyze the various protection schemes and their coordination Procedure(L4)
	C410.5	Analyze the effect of compensation on P.F improvement(L4)
Power System Reforms	C411.1	Discuss different restructuring models, including the roles of Independent System Operators (ISO) and Power Exchanges in a restructured power system (L2)
	C411.2	Apply methodologies to calculate transfer capabilities and reliability margins using the Open

Subject Name	NBA Code	Course Outcomes
		Access Same-Time Information System (OASIS) (L3)
	C411.3	Analyze electricity price volatility and forecasting methods to address challenges in electricity pricing. (L4)
	C411.4	Apply operational planning activities for strategic operation of Gencos in pool and bilateral markets(L3)
	C411.5	Recognize the significance of synchronous generators in providing reactive power as an ancillary service within power systems(L2)
UNIX and Shell Programming	C413.1	Understand basic Linux commands (L2)
	C413.2	Understand and apply commands on file Utilities (L2)
	C413.3	Understand and apply about filters, streams and pipes (L2)
	C413.4	Understand and apply Grep and Sed commands on patterns (L2)
	C413.5	Apply the system calls for the Implementation of file system management (L3)
Neural Network and Fuzzy Logic	C414.1	Explain Basic Concepts of ANN (L2)
	C414.2	Explain the Architecture of Neural Networks Models (L2)
	C414.3	Identify and describe Fuzzy Logic and Artificial Neural Network techniques in building intelligent machines (L3)
	C414.4	Apply Artificial Neural Network & Fuzzy Logic models to handle uncertainty and solve engineering problems (L3)
	C414.5	Recognize the feasibility of applying a Neuro-Fuzzy model for a particular problem (L4)
Robotics	C419.1	Demonstrate The classification of Robots (L2)
	C419.2	Identify the different types of actuators in robotics (L3)
	C419.3	Analyze the different sensors and their uses in the Robotics (L4)

Subject Name	NBA Code	Course Outcomes
	C419.4	Develop the control techniques for robots(L3)
	C419.5	Analyze robot performance testing methodologies(L4)
VLSI System Design	C420.1	Introduce the various steps involved in the MOS transistor fabrication of integrated circuits(L2)
	C420.2	Explain the electrical properties of MOS devices(L2)
	C420.3	Introduce design rules and scaling effects in CMOS technology(L2)
	C420.4	Observe the behavior of inverters designed with various loads(L2)
	C420.5	Provide an overview of testing fundamentals and its testability design(L2)
Universal Human Values -2: Understanding Harmony	C422.1	Apply elements and process of value education to live happy life (L3)
	C422.2	Develop thoughts, emotions, physical sensations of the self & body and harmonize their Inter and Intra relations(L3)
	C422.3	Analyze human relations and their role in ensuring harmonious family and society(L4)
	C422.4	Analyze the holistic perceptions of harmony in existence with reference to nature(L4)
	C422.5	Develop professional ethics with universal human values and holistic technologies(L3)
PCB Design	C423.1	Design reliable circuits using appropriate electronic components for various practical applications(L3)
	C423.2	Design power supply modules (±5V, ±9V, ±12V, ±15V) with appropriate components, ensuring voltage, current, and safety requirements using Proteus for schematic and PCB layout design(L3)
	C423.3	Simulate and implement rectifier circuits (half and full-wave) using Proteus for schematic and PCB layout design. (L3)
	C423.4	Design & simulate security systems, such as alarm circuits etc., using PCB design software like Proteus. (L3)
	C423.5	Fabricate an electronic printed circuit board (PCB) for a specific application by applying schematic capture and PCB layout techniques. (L3)
Summer Internship-II	424.1	Construct the company profile by compiling the brief history, management structure, product/services offered, key achievements and market performance of internship organization. (L3)
	424.2	Determine the challenges and future potential of internship organization in particular and the sector

Subject Name	NBA Code	Course Outcomes
		in general. (L5)
	424.3	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period. (L4)
	424.4	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization. (L3)
	424.5	Analyze the functioning of internship organization to assess its Strengths, Weaknesses, Opportunities and Threats (SWOT) and recommend changes for improvement in processes. (L4)
Project	425.1	Apply electrical engineering concepts to analyze ideas and develop physical or simulation models (L3)
	425.2	Demonstrate the ability to work independently and collaboratively in diverse teams (L2)
	425.3	Evaluate recent advancements in electrical and electronics engineering through a critical literature review and assess the implementation of innovative ideas using modern tools (L5)
	425.4	Develop models that contribute to society while adhering to research ethics and professional values (L6)
	425.5	Improve writing and presentation skills to effectively communicate research work and facilitate publication (L6)