JOGINPALLY B.R. ENGINEERING COLLEGE

Department of Electrical and Electronics Engineering

B.Tech. I Year I Sem.

I Year I Sem			
Course Code	**Course Name**	**Course Outcome No**	**Course Outcome-Statement**
MA101BS	**Mathematics-I**	C101.1	Formulate the matrix representation of a set of linear equations and analyze the solutions of the system.
		C101.2	Solve higher differential equation and apply the concept of differential equation to real world problems
		C101.3	Analyze the nature of sequence and series
		C101.4	Evaluate the improper functions using beta and gamma functions
		C101.5	Apply multivariable calculus and find the extreme values of functions of two variables with/ without constraints
CH102BS	**Chemistry**	C102.1	Apply basic knowledge of electrochemical procedures.
		C102.2	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
		C102.3	Acquire the knowledge of fuels and its usage in domestic and industrial purposes
		C102.4	Analyze predictions about the general properties of materials
		C102.5	Evaluate molecular structures and their frequencies
EE103ES	**Basic Electrical Engineering**	C103.1	Apply fundamental circuit laws and theorems to analyze basic DC circuits.
		C103.2	Analyze basic Electric and Magnetic circuits
		C103.3	Understand the basic principles, efficiency, and applications of transformers.
		C103.4	Analyze working principles of Electrical Machines
		C103.5	Identify and understand essential components of low-voltage electrical installations and perform basic calculations for energy use and power factor improvement.

EN205HS	**English**	C104.1	Write efficiently for academic, business and personal situations using appropriate style and format
		C104.2	Comprehend a variety of written texts literally as well as understand their deeper meanings
		C104.3	Demonstrate a rich vocabulary
		C104.4	Communicate confidently in various contexts and different cultures
		C104.5	Recognize and understand the meaning of targeted grammatical structures in written and spoken form
ME105ES	**Engineering Workshop**	C105.1	Practice on machine tools and their operations
		C105.2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling
		C105.3	Practice on manufacturing of components using workshop trades including fitting, tin smithy and carpentry
		C105.4	Develop practical skills in individual trades, including plumbing, foundry
		C105.5	Apply basic electrical engineering knowledge for house wiring practice

CH106BS	**Engineering Chemistry Lab**	C106.1	Determine key water quality parameters, such as hardness and chloride content.
		C106.2	Estimate rate constant of a reaction from concentration – time relationships
		C106.3	Calculate the rate constant of reactions and synthesize common compounds like aspirin and paracetamol
		C106.4	Synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique
		C106.5	Measure physical properties such as viscosity, adsorption, surface tension, and partition coefficients of various substances.
EN107HS	**English Language and Communication Skills Lab**	C107.1	Utilize computer-assisted multimedia tools for individualized and independent English language practice
		C107.2	Develop awareness of English speech sounds word accent, intonation, and rhythm for clearer communication
		C107.3	Achieve consistent accent and intelligibility in English pronunciation through targeted speaking practice
		C107.4	Improve spoken English fluency and reduce mother tongue influence for clearer expression.

Course Code	Course Name	Course Outcome No	Course Outcome-Statement
		C107.5	Apply appropriate language and presentation skills for confident public speaking and successful interviews
EE108ES	**Basic Electrical Engineering Lab**	C108.1	Analyze a given network by applying various electrical laws and network theorems
		C108.2	Measure response of electrical circuits for different excitations
		C108.3	Calculate, measure and know the relation between basic electrical parameters
		C108.4	Analyze the performance characteristics of DC electrical machines
		C108.5	Analyze the performance characteristics of AC electrical machines

I Year II Sem			
Course Code	**Course Name**	**Course Outcome No**	**Course Outcome-Statement**
MA201BS	**Mathematics II**	C109.1	Identify whether the given differential equation of first order is exact or not
		C109.2	Solve higher differential equation and apply the concept of differential equation to real world problems
		C109.3	Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
		C109.4	Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
		C109.5	Analyze and understand the behavior of vector and scalar fields using differential operators such as gradient, divergence, and
AP202BS	**Applied Physics**	C110.1	Gain knowledge of basic principles of quantum mechanics
		C110.2	Examine the working principles of various semiconductor devices P-N diode, Hall effect, BJT Transistor.
		C110.3	Study the fundamental concepts related to Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics
		C110.4	Analyze the characteristics and functioning of lasers and optical fibers.
		C110.5	Identify the importance of Electromagnetism and Magnetic Properties of Materials

CS203ES	**Programming for Problem solving**	C111.1	Write basic C programs using operators, conditional statements, loops, and handle input/output.
		C111.2	Use arrays, strings, structures, and pointers to write C programs and manage data
		C111.3	Implement file handling in C using text and binary files, and apply preprocessor directives.
		C111.4	Develop functions and use dynamic memory allocation in C for efficient program design.
		C111.5	Implement basic algorithms for searching, sorting, and solving mathematical problems in C

ME204ES	**Engineering Graphics**	C112.1	Draw basic conic sections and use scales (plain and diagonal) to represent objects accurately
		C112.2	Create orthographic projections of points, lines, and plane figures using standard conventions.
		C112.3	Draw projections of regular solids, sectional views, and auxiliary views for various solids like prisms and cylinders
		C112.4	Develop surface areas of regular solids and analyze the intersection of different solids
		C112.5	Create isometric projections of simple and compound solids, and convert between isometric and orthographic views
AP205BS	**Applied Physics Lab**	C113.1	Measure the energy gap of a semiconductor diode and find the Hall coefficient to understand semiconductor properties.
		C113.2	Analyze the V-I characteristics of solar cells and LEDs to understand their performance
		C113.3	Determine the magnetic field using Stewart-Gee's experiment and learn about magnetism.
		C113.4	Analyze the characteristics of LASER sources and light-emitting diodes (LEDs) for optoelectronic applications.
		C113.5	Measure the time constant and quality factor in R-C and LCR circuits.
CS206ES	**Programming for Problem Solving lab**	C114.1	Formulate algorithms for solving simple problems and translate them into working programs.
		C114.2	Debug programs by identifying and correcting syntax and logical errors to ensure correct execution.
		C114.3	Manipulate data using arrays, strings, and structures for efficient storage and processing.
		C114.4	Use pointers effectively to manage memory and handle different data types.

		C114.5	Work with files by creating, reading, and writing simple text and binary files, and modularize the code for reusability.
MC209ES	**Environmental Science**	C115.1	Develop knowledge of the concept of environment, ecosystem and biodiversity.
		C115.2	Understand positive and negative effects of different natural resources
		C115.3	Describe biodiversity and conservation of biodiversity
		C115.4	Design control equipment for pollution control
		C115.5	Develop awareness about environmental protection and sustainability

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B.Tech. II Year

		II Year I Sem.	
Course Code	**Course Name**	**Course Outcome No**	**Course Outcome-Statement**
EE301ES	**Engineering Mechanics (EM)**	C201.1	Determine the resultant of forces acting on a body and analyze the equilibrium of a body subjected to a system of forces.
		C201.2	Solve problems of bodies subjected to friction.
		C201.3	Find the location of the centroid and calculate the moment of inertia of a given section.
		C201.4	Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion, and rigid body motion.
		C201.5	Solve problems using work-energy equations for translation, fixed-axis rotation, and plane motion, and solve problems of vibration.
EE302PC	**Electrical Circuit Analysis**	C202.1	Understand and apply network theorems
		C202.2	analyze the Transient behavior electrical circuits with different inputs
		C202.3	Understand and analyze the steady state behavior electrical circuits with sinusoidal source
		C202.4	Applying Laplace transforms for solving electrical network
		C202.5	Understand the concept of Network functions and Network Parameters
EE303PC	**Analog Electronics**	C203.1	Know the characteristics, utilization of various components
		C203.2	Understand the biasing techniques.
		C203.3	Design and analyze various rectifiers, small signal amplifier circuits.
		C203.4	Design sinusoidal and non-sinusoidal oscillators
		C203.5	A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.
EE304PC	**Electrical Machines - I**	C204.1	Identify different parts of a DC machine & understand its operation
		C204.2	Carry out different testing methods to predetermine the efficiency of DC machines

		C204.3	Understand different excitation and starting methods of DC machines
		C204.4	Control the voltage and speed of a DC machines
		C204.5	Analyze single phase and three phase transformers circuits
EE305PC	ELECTROMAGNETIC FIELDS	C205.1	Apply the concepts of electric field and magnetic field.
		C205.2	Applications of electric and magnetic fields in the development of the theory for power transmission lines and electrical machines.
		C205.3	Understand the basic laws of electromagnetism and their applications.
		C205.4	Analyze time varying electric and magnetic fields.
		C205.5	Understand the propagation of EM waves.
EE306PC	ELECTRICAL MACHINES LAB – I	C206.1	Start and control the Different DC Machines.
		C206.2	Assess the performance of different machines using different testing methods
		C206.3	Identify different conditions required to be satisfied for self - excitation of DC Generators
		C206.4	Separate iron losses of DC machines into different components.
		C206.5	The load sharing capabilities and reliability of electrical machines using parallel operation under various loading conditions.
EE307PC	Analog Electronics Lab	C207.1	Know the characteristics, utilization of various components.
		C207.2	Understand the biasing techniques
		C207.3	Design and analyze various rectifiers, small signal amplifier circuits
		C207.4	Design sinusoidal and non-sinusoidal oscillators.
		C207.5	A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.
EE308PC	Electrical Circuits Lab	C208.1	Analyze DC and AC circuits using various network theorems.
		C208.2	Determine the behaviour of circuits using time-response analysis and locus diagrams
		C208.3	Evaluate circuit parameters like Z, Y, A, B, C, D, and hybrid parameters for two-port networks
		C208.4	Analyze resonance in electrical circuits and separate mutual and self-inductances in coupled circuits.
		C208.5	Measure active and reactive power in three-phase systems and perform harmonic analysis for non-sinusoidal waveforms.

		II Year II Sem.		
MA401BS	LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES		C209.1	Understand working of logic families and logic gates
			C209.2	Design and implement Combinational and Sequential logic circuits.
			C209.3	Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			C209.4	Be able to use PLDs to implement the given logical problem.
			C209.5	Design and implement logical circuits using PLDs and understand memory types used in digital systems.
EE402PC	ELECTRICAL MACHINES – II		C210.1	Understand the concepts of rotating magnetic fields.
			C210.2	Understand the operation of ac machines.
			C210.3	Analyze performance characteristics of ac machines.
			C210.4	Understand and apply the concept of parallel operation in synchronous machines.
			C210.5	Gain knowledge about single-phase induction motors and their applications in household and industrial systems
EE403PC	DIGITAL ELECTRONICS		C211.1	Understand working of logic families and logic gates
			C211.2	Design and implement Combinational and Sequential logic circuits.
			C211.3	Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			C211.4	Be able to use PLDs to implement the given logical problem.
			C211.5	Design and implement logical circuits using Programmable Logic Devices (PLDs) and understand memory types used in digital systems.
EE404PC	CONTROL SYSTEMS		C212.1	Understand the modeling of linear-time-invariant systems using transfer function and state space representations
			C212.2	Understand the concept of stability and its assessment for linear-time invariant systems.
			C212.3	Design simple feedback controllers.
			C212.4	Design and implement feedback controllers (P, PI, PD, and PID) and compensators (Lead, Lag) for performance enhancement.
			C212.5	Analyze and design control systems using state-

			space models, including concepts of controllability, observability, and pole-placement methods.
EE405PC	**POWER SYSTEM - I**	C213.1	Understand the concepts of power systems
		C213.2	Understand the operation of conventional generating stations and renewable sources of electrical power
		C213.3	Evaluate the power tariff methods.
		C213.4	Determine the electrical circuit parameters of transmission lines.
		C213.5	Understand the layout of substation and underground cables and corona .
EE406PC	**DIGITAL ELECTRONICS LAB**	C214.1	Understand the concepts of power systems
		C214.2	Understand the operation of conventional generating stations and renewable sources of electrical power
		C214.3	Evaluate the power tariff methods.
		C214.4	Determine the electrical circuit parameters of transmission lines.
		C214.5	Use Programmable Logic Devices (PLDs) to implement given logical problems
EE407PC	**ELECTRICAL MACHINES LAB – II**	C215.1	Assess the performance of different machines using different testing methods
		C215.2	To convert the Phase from three phase to two phase and vice versa
		C215.3	Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods.
		C215.4	Control the active and reactive power flows in synchronous machines
		C215.5	Start different machines and control the speed and power factor
EE408PC	**CONTROL SYSTEMS LAB**	C216.1	How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
		C216.2	Apply various time domain and frequency domain techniques to assess the system performance
		C216.3	Apply various control strategies to different applications (example: Power systems, electrical drives etc)
		C216.4	Test system controllability and observability using state space representation and applications of state space representation to various systems
		C216.5	Analyze the system's stability in time and frequency domain by computing gain and phase

			margin.

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III Year I Sem I			
EE501PE	**POWER ELECTRONICS**	C301.1	Understand the differences between signal level and power level devices.
		C301.2	Analyze controlled rectifier circuits
		C301.3	Analyze the operation of DC-DC choppers
		C301.4	Analyze the operation of voltage source inverters
		C301.5	Explore the principles of operation and applications of AC-AC converters such as phase controllers and cyclo-converters
EE502PE	**Power systems II**	C302.1	Analyze transmission line performance.
		C302.2	Apply load compensation techniques to control reactive power
		C302.3	Understand the application of per unit quantities.
		C302.4	Design over voltage protection and insulation coordination
		C302.5	Determine the fault currents for symmetrical and unbalanced faults
EE503PE	**MEASUREMENTS AND INSTRUMENTATION**	C303.1	Understand different types of measuring instruments, their construction, operation and characteristics
		C303.2	Identify the instruments suitable for typical measurements
		C303.3	Apply the knowledge about transducers and instrument transformers to use them effectively.
		C303.4	Apply the knowledge of smart and digital metering for industrial applications
		C303.5	Select and utilize appropriate transducers and smart metering devices for industrial and engineering applications
EE512PE	**HIGH VOLTAGE ENGINEERING (PE-1)**	C304.1	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
		C304.2	Knowledge of generation and measurement of D. C., A.C., & Impulse voltages
		C304.3	Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
		C304.4	Knowledge of how over-voltages arise in a power system, and protection against these overvoltage's

		C304.5	Evaluate high voltage testing methods for electrical equipment and interpret standards for high voltage laboratories
SM504MS	**BUSINESS ECONOMICS AND FINANCIAL ANALYSIS**	C305.1	Explain the structure and types of business entities and their significance in an economic context
		C305.2	Analyse demand and supply factors to forecast and make informed business decisions
		C305.3	Examine cost structures, market dynamics, and pricing strategies for optimizing business operations.
		C305.4	Apply accounting principles to prepare and interpret financial statements of a business.
		C305.5	Conduct financial analysis using ratio techniques to evaluate the financial performance of a firm.
EE505PC	**POWER SYSTEM SIMULATION LAB**	C306.1	Perform various transmission line calculations
		C306.2	Understand Different circuits time constants
		C306.3	Analyze the experimental data and draw the conclusions.
		C306.4	Calculate and interpret time constants in RL, RC, and RLC circuits for transient behaviour analysis
		C306.5	Simulate resonance circuits and estimate power tariffs based on practical load.
EE506PC	**POWER ELECTRONICS LAB**	C307.1	Understand the operating principles of various power electronic converters.
		C307.2	Use power electronic simulation packages& hardware to develop the power converters
		C307.3	Analyze and choose the appropriate converters for various applications
		C307.4	Evaluate the impact of load types (R, RL, RLE) on converter performance and waveforms
		C307.5	Apply and assess modern PWM techniques for improving converter efficiency and control.
EE507PC	**MEASUREMENTS AND INSTRUMENTATION LAB**	C308.1	Select appropriate instruments for various electrical measurements.
		C308.2	Calibrate electrical instruments to ensure accuracy
		C308.3	Calibrate electrical instruments to ensure accuracy
		C308.4	Analyze power measurement methods and calculate three-phase active and reactive power
		C308.5	Test and determine ratio errors and phase angle deviations in CTs and PTs.
EN508HS		C309.1	Apply effective interpersonal communication techniques in professional and social settings.

	ADVANCED COMMUNICATION SKILLS LAB	C309.2	Demonstrate enhanced reading comprehension and critical analysis skills
		C309.3	Create professional documents such as resumes, reports, and formal letters
		C309.4	Deliver effective oral presentations and participate confidently in group discussions
		C309.5	Prepare for and succeed in interviews with proper planning and communication strategies.
MC510	**Intellectual property Rights**	C319.1	Use various types of Intellectual property and International Organizations, Agencies and treaties for filing Intellectual property
		C319.2	Register trademarks in various jurisdictions to ensure robust legal and ethical coverage.
		C319.3	Utilize copyright and patent laws to effectively protect organization's intellectual property
		C319.4	Identify and Classify Trade Secrets for developing the organizations
		C319.5	Develop and implement new intellectual property strategies while maintaining an international perspective on intellectual property laws.
	Artificial Intelligence	C321.1	To learn the distinction between optimal reasoning Vs. human like reasoning
		C321.2	To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
		C321.3	To learn different knowledge representation techniques.
		C321.4	To understand the applications of AI, namely game playing, theorem proving, and machine learning.
		C321.5	Study of Markov Models enable the student ready to step into applied AI
III Year II Sem.			
MT601OE	**NON-CONVENTIONAL ENERGY SOURCES (Open Elective – I)**	C310.1	Explain the principles and working mechanisms of various non-conventional energy sources.
		C310.2	Analyze the technical and economic feasibility of implementing different renewable energy technologies in specific scenarios
		C310.3	Evaluate the environmental impacts and sustainability aspects of non-conventional energy sources
		C310.4	Design and analyze basic renewable energy systems considering energy storage options.
		C310.5	Discuss the policy and regulatory frameworks

			related to the adoption of renewable energy technologies
EE612PE	**POWER SEMICONDUCTOR DRIVES(PE-2)**	C311.1	To introduce the drive system and operating modes of drive and its characteristics
		C311.2	To understand Speed – Torque characteristics of different motor drives by various power converter topologies
		C311.3	To appreciate the motoring and braking operations of drive
		C311.4	To differentiate DC and AC drives.
		C311.5	Design and analyze the control of synchronous motors using advanced converter techniques and closed-loop systems
EE601PC	**SIGNALS AND SYSTEMS**	C312.1	Differentiate various signal functions.
		C312.2	Represent any arbitrary signal in time and frequency domain
		C312.3	Understand the characteristics of linear time invariant systems.
		C312.4	Analyze the signals with different transform technique
		C312.5	Understand and apply sampling theorem, and perform correlation analysis to extract signals from noise and perform signal reconstruction.
EE602PC	**MICROPROCESSO RS & MICROCONTROLL ERS**	C313.1	Understands the internal architecture, organization and assembly language programming of 8086 processors
		C313.2	Understands the internal architecture, organization and assembly language programming of 8051/controllers
		C313.3	Understand the characteristics of linear time invariant systems.
		C313.4	Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors
		C313.5	Explore the architecture and programming aspects of advanced ARM processors like Cortex and OMAP
EE603PC	**POWER SYSTEM PROTECTION**	C314.1	Compare and contrast different types of protective relays such as electromagnetic, static, and microprocessor-based relays.
		C314.2	Apply appropriate protection schemes and settings for power system components including transformers, generators, and feeders.
		C314.3	Select and set the correct relay settings for overcurrent and distance relays, ensuring reliable system protection.

		C314.4	Analyze the different types of circuit breakers and their quenching mechanisms (air, oil, vacuum) used in power systems
		C314.5	Evaluate the performance and operation of static and microprocessor-based relays and identify their advantages in modern protection
EE604PC	POWER SYSTEM OPERATION AND CONTROL	C315.1	Understand the operation and control of power systems, including real and reactive Analyze system stability and understand whether a machine is in a stable or unstable position power management.
		C315.2	Analyze various functions of the Energy Management System (EMS), including load flow studies and load forecasting
		C315.3	Analyze system stability and understand whether a machine is in a stable or unstable position
		C315.4	Understand power system deregulation and restructuring, and their impact on operation and control
		C315.5	Apply the concepts of load frequency control, economic operation, and power system stability to real-world power systems
EE605PC	POWER SYSTEM LAB	C316.1	Perform testing and analysis of CT, PT, insulator strings, and other components of the power system
		C316.2	Understand and calculate the sequence impedances of synchronous machines and transformers
		C316.3	Analyze and interpret the results of load flow studies using Gauss-Seidel and Fast Decoupled methods
		C316.4	Apply fault analysis techniques to transmission line models and generators
		C316.5	Conduct experimental studies on various protection systems, including over-current relays, microprocessor-based protection, and differential protection
EE606PC	MICROPROCESSORS & MICROCONTROLLERS LAB	C317.1	Develop and debug assembly language programs on 8086 for arithmetic, logical, and string operations
		C317.2	Design and execute programs using 8051 microcontrollers for arithmetic, logical, timer-based, and serial communication tasks
		C317.3	Interface 8051 microcontroller with I/O devices like matrix keypad, 7-segment display, ADC, and DAC.

EE607PC		C317.4	Generate waveforms and sequence signals using 8051 microcontroller and DAC interfaces
		C317.5	Analyze and solve real-time problems using 8086 and 8051 through proper debugging and implementation of programs.
EE607PC	**SIGNALS AND SYSTEMS LAB**	C318.1	Analyze the properties of continuous-time and discrete-time signals and systems.
		C318.2	Examine systems in the frequency domain using Fourier techniques.
		C318.3	Understand and apply the principles of sampling and its implications in signal reconstruction.
		C318.4	Implement and verify discrete-time operations such as convolution and filtering.
		C318.5	Evaluate the frequency and phase response of systems using computational tools.
MC609	**Environmental Science**	C320.1	Develop knowledge of the concept of environment, ecosystem and biodiversity.
		C320.2	Understand positive and negative effects of different natural resources
		C320.3	Describe biodiversity and conservation of biodiversity
		C320.4	Design control equipment for pollution control
		C320.5	Develop awareness about environmental protection and sustainability
	Cyber Security	C322.1	To familiarize various types of cyber-attacks and cyber-crimes
		C322.2	To give an overview of the cyber laws
		C322.3	To study the defensive techniques against these attacks
		C322.4	To gain knowledge of Organizational Implications in Cyber Security
		C322.5	To get awareness on Privacy issues

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B.Tech. IV Year I Sem.

		IV Year I Sem.	
CS702OE	Surface Engineering	C401.1	Indicate the need for surface engineering
		C401.2	Indicate the different methods of surface engineering
		C401.3	Differentiate between the methods used and indicate their relative merits
		C401.4	Understand aspects associated with industrial applications of surface engineering
		C401.5	Analyze the surface engineering problems.
EE713PE	ELECTRICAL AND HYBRID VEHICLES (PE – III)	C402.1	Describe the performance characteristics and mathematical models of conventional vehicles
		C402.2	Explain the configurations, topologies, and control of hybrid drive-trains
		C402.3	Analyze the electric drive-train configurations and the efficiency of different electric propulsion units.
		C402.4	Evaluate various energy storage technologies and their integration into hybrid and electric vehicles.
		C402.5	Design energy management strategies and optimize hybrid and electric vehicle performance through case studies
EE721PE	HVDC TRANSMISSION (PE – IV)	C403.1	Compare EHV AC and HVDC transmission systems, and describe the types of HVDC links and equipment.
		C403.2	Analyze the Graetz circuit for both rectifier and inverter modes, and evaluate the performance of 6-pulse and 12-pulse converters.
		C403.3	Explain the control principles of HVDC systems, including firing angle and extinction angle control, and perform AC/DC power flow analysis.
		C403.4	Describe the protection methods for HVDC systems, including surge arresters and smoothing reactors, and analyze converter faults.
		C403.5	Classify harmonics, calculate harmonic distortions, and design filters to mitigate adverse effects of harmonics.
		C404.1	Explain the basic concepts, functions, and

SM701M S	**FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS**		approaches of management, including their evolution and relevance.
		C404.2	Apply planning and decision-making frameworks to solve problems and foster innovation in managerial work.
		C404.3	Analyze organizational structures, culture, and HRM practices for effective workforce management.
		C404.4	Demonstrate leadership styles and motivational strategies to enhance team and organizational performance.
		C404.5	Design and implement effective control systems to monitor and improve organizational outcomes.
EE701PC	**ELECTRICAL & ELECTRONICS DESIGN Lab**	C405.1	Acquire practical knowledge of electrical components and systems.
		C405.2	Design and fabricate electrical and electronic circuit elements and networks.
		C405.3	Diagnose and troubleshoot electrical and electronic circuits effectively.
		C405.4	Design and implement filter circuits for specific applications.
		C405.5	Develop skills in soldering, winding, and PCB design for real-world engineering applications.
EE702PC	**INDUSTRIAL ORIENTED MINI PROJECT/SUMMER**	C406.1	Apply theoretical knowledge to solve practical engineering problems encountered during the internship.
		C406.2	Demonstrate enhanced technical skills and the ability to use modern engineering tools in a real-world environment.
		C406.3	Exhibit professional ethics, effective communication, and teamwork in an industrial setting.
		C406.4	Develop innovative solutions and demonstrate creativity in addressing engineering challenges.
		C406.5	Prepare comprehensive reports and presentations reflecting the internship experience and learning
EE703PC	**SEMINAR**	C407.1	Conduct thorough literature reviews to identify and understand current advancements in engineering.
		C407.2	Critically analyze and interpret research findings to draw informed conclusions.
		C407.3	Deliver clear and concise technical presentations to effectively communicate complex ideas.
		C407.4	Demonstrate self-motivation in exploring new

			technologies and methodologies relevant to their field.
		C407.5	Recognize and discuss ethical issues and societal implications associated with engineering solutions.
EE704PC	PROJECT STAGE 1	C408.1	Formulate a comprehensive project plan addressing specific engineering problem.
		C408.2	Apply engineering principles and techniques to develop project prototypes or models.
		C408.3	Collaborate effectively within a team to achieve project objectives.
		C408.4	Identify and analyze challenges encountered during project development and propose viable solutions.
		C408.5	Communicate project concepts and progress through well-structured reports and presentations.
IV Year II Sem.			
EC800OE	MEASURING INSTRUMENTS (Open Elective - III)	C409.1	Identify and select suitable sensors and transducers for real-time applications.
		C409.2	Apply theoretical concepts to develop functional measurement models.
		C409.3	Understand the fundamentals of measuring devices and utilize them effectively in relevant situations.
		C409.4	Measure physical parameters such as velocity, acceleration, force, pressure, and viscosity using appropriate instruments.
		C409.5	Analyze measurement data and assess the accuracy and reliability of different measuring instruments.
EE811PE	POWER QUALITY AND FACTS (PE - V)	C410.1	Identify and evaluate the severity of power quality problems in distribution systems.
		C410.2	Analyze voltage sag transformation across different voltage levels in a power system.
		C410.3	Propose appropriate custom power devices to mitigate power quality issues for sensitive loads.
		C410.4	Select suitable FACTS controllers based on specific system requirements and applications.
		C410.5	Comprehend the operational principles and control circuits of Shunt and Series Controllers such as SVC, STATCOM, GCSC, TSSC, and TCSC.
		C411.1	Distinguish between transmission and distribution lines and design the feeders.
		C411.2	Compute power loss and voltage drop of the

EE822PE	**ELECTRICAL DISTRIBUTION SYSTEMS (PE - VI)**		feeders.
		C411.3	Design protection of distribution systems.
		C411.4	Understand the importance of voltage control and power factor improvement.
		C411.5	Analyze and implement methods for compensation in power distribution systems
EE801PC	**PROJECT STAGE 2**	C412.1	Apply advanced engineering knowledge to design and develop comprehensive project solutions.
		C412.2	Conduct thorough research and utilize innovative approaches to address complex engineering challenges.
		C412.3	Demonstrate effective teamwork and communication skills in the execution of project tasks.
		C412.4	Exhibit professional and ethical responsibility in all aspects of project development.
		C412.5	Recognize the need for lifelong learning and demonstrate the ability to engage in continuous professional development.

PAC Coordinator   **HoD**