DEPARTMENT OF ELECTRICAL ENGINEERING

SECOND YEAR

SEMESTER -I		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
ENGINEERING MATHEMATICS-III (EL211-21)	**Solve** problems on linear differential equations with constant coefficients.	BL3 APPLY
	Solve cauchy's and legendres linear differential equation and apply lde to electrical engineering problem	BL3 APPLY
	Explain and **apply** properties of laplace and inverse laplace transform to solve the numericals	BL2 UNDERSTAND, BL3 APPLY
	Derive solutions for partial differential equations with its different forms	BL3 APPLY
	Determine solutions for numericals of complex integration problems.	BL3 APPLY
	Compute z and inverse z transform.	BL3 APPLY
ELECTRICAL MACHINES-I (EL212-21)	**Explain** the working principles, construction, and operation of dc machines and single-phase and three-phase transformers.	BL2 UNDERSTAND
	Solve numerical problems and **analyse** the performance of dc machines through different characteristics.	BL3 APPLY, BL4 ANALYZE
	Apply the knowledge of testing and applications of dc machines	BL3 APPLY
	Use different connection & determine or derive the equivalent circuit & phasor diagram of transformer.	BL3 APPLY, BL5 EVALUATE
	Analyze the performance of transformers by conducting tests.	BL4 ANALYZE
ELECTRICAL MEASUREMENT AND INSTRUMENTATION (EL213-21)	**Define** the characteristics &**discuss** the concept of electrical measuring instruments.	BL1REMBER , BL2 UNDERSTAND
	Demonstrate the construction and working principle of analog & digital instruments and calculate its parameters.	BL2 UNDERSTAND, BL3 APPLY
	Explain & Derive expressions of potentiometer an bridges.	BL2 UNDERSTAND, BL3 APPLY
	Describe the types of transducer and instrument transformer & examine its parameters.	BL2 UNDERSTAND, BL3 APPLY
	Demonstrate the construction and working principle of digital instruments.	BL2 UNDERSTAND,
	Elaborate the concept & types of oscilloscope.	BL2 UNDERSTAND,

POWER SYSTEM-I (EL214-21)	**Define**& **compute** basic terms used in power system operation.	BL1REMBER , BL2 UNDERSTAND
	Understand conventional & non-conventional energy sources and explain working of base load plant.	BL1REMBER , BL2 UNDERSTAND
	Discuss working of peak load power plant.	BL2 UNDERSTAND
	Demonstrate the structure of power system & discuss concept of different transmission system.	BL2 UNDERSTAND
	Apply the Kelvin's law & compare the cost for various AC transmission system.	BL2 UNDERSTAND, BL3 APPLY
	Describe the components of overhead transmission line & calculate the string efficiency.	BL3 APPLY
ELECTRONIC DEVICES AND CIRCUITS (EL215-21)	**Define**, explain and calculate the parameter of BJT.	BL1REMBER, BL2 UNDERSTAND, BL3 APPLY
	Design and **explain** the amplifier using BJT the amplifier using BJT	BL2 UNDERSTAND, BL4 ANALYZE
	Derive and **determine** the parameter of hybrid model of BJT.	BL3 APPLY
	Draw and **compare** different type of FET.	BL2 UNDERSTAND,
	Design and derive unregulated power supply by using different parameter.	BL2 UNDERSTAND, BL3 APPLY
	Classify & differentiate types of amplifiers	BL3 APPLY BL4 ANALYZE
OBJECT ORIENTED PROGRAMMING WITH C++	**Understand** and **Analyze** concept the Simple C++ Programming	BL2 UNDERSTAND
	Apply Principals of OOP concept and explore their skill to develop complex C++ Program	BL2 UNDERSTAND
	Apply various OOP functions to write C++ Program	BL3 APPLY
	Understand &**Apply** the Concept of Inheritance to write C++ program	BL3 APPLY
	Develop the application using object oriented programming with C++	BL3 APPLY
	Write the simple object oriented programming in C++ using objects and classes	BL3 APPLY

SEMESTER -II		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
NUMERICAL METHODS AND LINEAR ALGEBRA (EL221-19)	**Solve** algebraic, transcendental and simultaneous linear equations by using various methods	BL3 APPLY
	Calculate first order and simultaneous differential equations	BL3 APPLY
	Examine the numerical methods to evaluate definite integrals	BL3 APPLY
	Study matrix equations, vector spaces and simplify linear transformations	BL3 APPLY
	Apply the theory of Eigen values and Eigen vectors to solve numerical	BL3 APPLY
	Use orthogonally property and inner product concept to solve numericals	BL3 APPLY
ELECTRICAL MACHINES-II (EL222-19))	**Describe** the working principles, construction and operation of three-phase, single-phase induction motors and synchronous machines	BL2 UNDERSTAND
	Explain characteristics, and compare the starting and speed control of induction motors.	BL3 APPLY,
	Solve numerical problems and derive expressions for induction motors and synchronous machines	BL3 APPLY
	Analyze the performance of three-phase, single-phase induction motors and synchronous machines through the equivalent circuit and vector diagram.	BL3 APPLY,
POWER SYSTEM II (EL223-19)	**Explain** the concept of corona and sag and calculate its various parameters	BL3 APPLY
	Explain the effects and derive the expressions for different constants of transmission line.	BL3 APPLY
	Describe underground cables and determine their parameters.	BL3 APPLY
	Distinguish types of transmission line & examine the performance of transmission line.	BL3 APPLY
	Describe various power distribution systems & calculate various parameters of power distribution systems	BL3 APPLY
	Discuss the components of substation equipment's and methods of grounding	BL2 UNDERSTAND
ANALOG & DIGITAL INTEGRATED CIRCUITS (EL224-19)	**Draw** & **design** the characteristics of differential & operational amplifier	BL1REMEBER BL2 UNDERSTAND
	Describe and **analyze** the concept of configuration of op amp & its applications	BL2 UNDERSTAND, BL4ANALYZE
	Discuss &**design** combinational logic circuits & flip flops	BL3 APPLY BL5EVALUATION
	Perform sequential logic circuits	BL3 APPLY

NETWORK ANALYSIS (EL225-19	**Understand** fundamentals of op amp and compare characteristics of ideal and practical op amp	BL1REMBER BL2 UNDERSTAND
	Describe and analyze the concept open loop and closed loop configuration of op amp its applications	BL2 UNDERSTAND BL4 ANALYZE
	Understand the fundamentals of logic families.	BL3 APPLY BL5 EVALUATE
	Realize different combinational logic circuits	BL3 APPLY
COMPUTER AIDED DESIGN AND SIMULATION (EL226-19)	**Handle design and simulation** software's for different applications in electrical engineering	BL2 UNDERSTAND
	Create design of various devices used in electrical engineering	BL3 APPLY
	Simulate and compute KCL, KVL and different network theorems	BL3 APPLY
	Analyze steady state condition of various electrical devices through simulation	BL4 ANALYZE

DEPARTMENT OF ELECTRICAL ENGINEERING

THIRD YEAR

SEMESTER -I		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
POWER SSYTEM - III (EL311-20)	**Explain per unit system and Determine** the various parameters of power system component	BL2 UNDERSTANDBL3 APPLY
	Analyze the symmetrical fault in power system &**select** proper circuit breaker rating	BL4ANALYZEBL1R EMBER
	Draw & calculate symmetrical component or given power system	BL2 UNDERSTANDBL3 APPLY
	Derive expression &**determine** unsymmetrical fault current	BL3 APPLY
	Explain& implement the various methods for load flow studies.	BL3 APPLY
	Analyze steady state &transient stability of power system using analytical method.	BL4ANALYZE
LINEAR CONTROL SYSTEM (EL312-20)	**Explain** basic terminology, types of control system &**derive** expression for transfer function.	BL2 UNDERSTANDBL3 APPLY
	Derive mathematical model of physical system using different analogies.	BL3 APPLY
	Discuss model reduction techniques &**calculate** the T/F of given system.	BL2 UNDERSTAND BL3 APPLY
	Compute the time response &**determine** the performance through time domain specification, steady state error count & controllers.	BL4ANALYZE
	Explain & **examine** the stability of given system.	BL2 UNDERSTANDBL3 APPLY
MICROPROCESSOR AND MICROCONTROLLER (EL313-20)	**Explain** Architecture and Different Terms Of 8085.	BL2 UNDERSTAND
	Discuss Different Terms of 8051 Microcontroller & Compare Microprocessor & Microcontroller,	BL2 UNDERSTAND
	Write Assembly Language Programming For Different Applications Using 8051.	BL5 EVALUATE
	Analyze Various Interfacing Techniques For External Devices.	BL4 ANALYZE
	Perform Operations In Electrical Applications Using 8051	BL3 APPLY

ELECTROMAGNETIC ENGINEERING (EL314-20)	**Convert** vectors in different co-ordinates systems &**determine** electric field parameters for charge distribution.	BL2 UNDERSTAND BL3 APPLY
	Explain laws &theorem of static electric fields & solve its numerical.	BL2 UNDERSTAND BL3 APPLY
	Derive and **analyze** expression for laws and boundary conditions to solve numerical on electric fields.	BL3 APPLY BL4ANALYZE
	Explain different magnetic materials with their properties and **compute** magnetic boundary condition	BL2 UNDERSTAND BL3 APPLY BL4ANALYZE
	Derive and **analyze** Maxwell equations in integral and point form for different fields conditions.	BL3 APPLY BL4ANALYZE
	Derive Maxwell's equations in integral and point form for static, time varying and harmonically varying fields.	BL3 APPLY BL4ANALYZE
HYBRID ELECTRIC VEHICLE DESIGN (EL315-20)	**Explain** the fundamentals of hybrid electric vehicle with architecture and compare with conventional vehicles.	BL2 UNDERSTAND
	Discuss the usage of different power electronic devices & electrical modify in HEV.	BL2 UNDERSTAND
	Select appropriate energy storage technologies for HEV.	BL3 APPLY
	Write fundamentals of Regenerative Breaking in HEV.	BL1REMBER
	Design and implementation of drive system for HEV's	BL3 APPLY BL5 EVALUATE
	Classify & compare different energy management systems	BL2 UNDERSTAND

SEMESTER -II		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
ELECTRICAL MACHINE DESIGN (EL321-20)	**Explain** the basic concepts related to the design of electrical machines	BL2 UNDERSTAND
	Design the main dimensions & analyze the performance of single phase, three phase transformer.	BL3 APPLY
	Estimate the main dimensions & analyze the performance of dc machine.	BL3 APPLY
	Calculate the main dimensions & analyze the performance of induction motor.	BL3 APPLY
	Design the main dimensions & analyze the performance of synchronous machine.	BL3 APPLY
ELECTRICAL UTILISATION (EL322-20)	**Explain** fundamental concepts of traction systems and controlling of traction motor.	BL2 UNDERSTAND
	Discuss techniques for braking system implementation in traction.	BL2 UNDERSTAND
	Select of different types of motors for industrial application.	BL4 ANALYZE
	Write terms related to electric heating and welding techniques.	BL3 APPLY
	Illustrate electrical lighting and illumination schemes.	BL3 APPLY
	Elaborate the importance of energy conservation in different sector.	BL2 UNDERSTAND
POWER ELECTRONICS (EL323-20)	**Explain** the Characteristics of SCR with different operating conditions	BL2 UNDERSTAND
	Discuss the different power semiconductor devices along with their characteristics and application	BL2 UNDERSTAND
	Analyze phase controlled rectifier and its waveforms	BL4 ANALYZE
	Demonstrate the operating principles of DC to DC Converters	BL3 APPLY
	Discuss & analyze different types of inverters	BL2 UNDERSTAND
	Elaborate the AC Voltage Controller and its applications	BL2 UNDERSTAND
SIGNALS & SYSTEMS (EL324-20)	**Explain** the fundamental characteristics of signals and systems.	BL1 REMBER BL3 APPLY
	Classify systems based on their properties and determine the response of LTI system using convolution.	BL2 UNDERSTAND BL3 APPLY
	Analyze both continuous and discrete time systems in time, frequency domain and z domain.	BL3 APPLY BL4ANALYZE
	Identify system properties based on impulse response and Analyze the spectral characteristics of signals using Fourier analysis..	BL2 UNDERSTAND BL3 APPLY
	Apply DFT for the analysis of digital signals and systems	BL3 APPLY BL4ANALYZE

SENSORS AND APPLICATIONS (EL325B-20)	**Elaborate** the concept of sensors & its characteristics.	BL2 UNDERSTAND
	State & explain the working principle of analog & digital sensor.	BL1 REMEMBER, BL2 UNDERSTAND
	Design sensor interface circuits for a given engineering problem.	BL4 ANALYZE
	Select appropriate sensor based on a given engineering application	BL1 REMEMBER
	Describe the principle of sensor material and technology of a sensor.	BL2 UNDERSTAND
	Describe the working principle of different types of actuators.	BL2 UNDERSTAND
MINI HARDWARE PROJECT (EL327-20)	**Understand,** plan and execute a mini project with team.	BL2 UNDERSTAND
	Device electronic hardware by implementing knowledge of pcb design techniques, soldering techniques and hardware debugging techniques	BL3 APPLY
	Prepare technical report based on the mini project & estimate cost of the mini project, deliver technical seminar over mini project.	BL2 UNDERSTANDBL3 APPLY

DEPARTMENT OF ELECTRICAL ENGINEERING

FOURTH YEAR

SEMESTER -I		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
RENEWABLE ENERGY SOURCES (EL411)	**Explain & demonstrate** measurement, collection and storage of solar energy.	BL2 UNDERSTANDBL3 APPLY
	Discuss & analyze electricity generation from non-conventional energy sources.	BL2 UNDERSTAND BL4ANALYZE
	Elaborate direct energy conversion methods.	BL2 UNDERSTAND
SWITCHGEAR AND PROTECTION (EL 412)	**Understand and Apply** Operating Principles of Different Relays for Protection.	BL1REMMBER BL2 UNDERSTAND
	Select a Drive for a Particular Application Based On Power Rating & Based On Mechanical Characteristics For a Particular Drive application.	BL1REMMBER
	Explain and **Analyze** the Speed Control of DC Motors Using Rectifiers and Choppers Also Determine the Motor Parameters.	BL2 UNDERSTANDBL3 APPLYBL4ANALYZE
	Understand and **Explain** the Speed Control of Induction Motors Using Inverters also Calculate the Motor Parameters.	BL2 UNDERSTANDBL4 ANALYZE
	Understand and **Explain** the Speed Control of Induction Motors Using Inverters also Calculate the Motor Parameters.	BL1REMMBER BL2 UNDERSTAND
	Describe the Stepper Motor Drives Operation & its Converter Circuit and Explain Solar And Battery-Operated Operation of Drives.	BL1REMMBER BL2 UNDERSTAND
IDUSTRIAL DRIVES AND CONTROL (EL 413)	**Understand** the Principle and Operation of Electrical Drives.	BL1REMMBER BL2 UNDERSTAND
	Select a Drive for a Particular application based on Power Rating & Based on Mechanical Characteristics for a Particular Drive Application.	BL1REMMBER
	Explain and analyze the Speed Control of DC Motors Using Rectifiers and Choppers also Determine the Motor Parameters.	BL2 UNDERSTANDBL3 APPLYBL4ANALYZE
	Understand and **Explain** the Speed Control of Induction Motors Using Inverters also Calculate the Motor Parameters.	BL2 UNDERSTANDBL4 ANALYZE
	Understand The Characteristics and Explain Speed Control of Synchronous & BLDC Motor Drives Using VSI.	BL1REMMBER BL2 UNDERSTAND
	Describe The Stepper Motor Drives Operation & Its Converter circuit and explain Solar and Battery-Operated Operation of Drives.	BL1REMMBER BL2 UNDERSTAND

POWER SYSTEM OPERATION AND CONTROL (EL414)	**Understand** Operation and Control of Power Systems	BL1REMMBER BL2 UNDERSTAND
	Analyze the Various Load Characteristics with Load Curve and Load Duration Curve	BL1REMMBER BL2 UNDERSTANDBL3 APPLY
	Solve Economic Dispatch Problems and Unit Commitment Problems in Power System	BL2 UNDERSTANDBL3 APPLY BL5 EVALUATE
	Explain the Modelling of Reactive Power-Voltage Interaction And The Control Actions	BL2 UNDERSTANDBL3 APPLY
	Explain the Concept of Reactive Power Control and Voltage Stability	BL1REMMBER BL2 UNDERSTAND
SWITCHGEAR AND PROTECTION (EL 415)	**Understand and Apply** Operating Principles of Different Relays for Protection.	BL1REMMBER BL2 UNDERSTAND
	Select a Drive for a Particular Application Based On Power Rating & Based On Mechanical Characteristics For a Particular Drive application.	BL1REMMBER
	Explain and **Analyze** the Speed Control of DC Motors Using Rectifiers and Choppers Also Determine the Motor Parameters.	BL2 UNDERSTANDBL3 APPLYBL4ANALYZE
	Understand and **Explain** the Speed Control of Induction Motors Using Inverters also Calculate the Motor Parameters.	BL2 UNDERSTANDBL4 ANALYZE
	Understand and **Explain** the Speed Control of Induction Motors Using Inverters also Calculate the Motor Parameters.	BL1REMMBER BL2 UNDERSTAND
	Describe the Stepper Motor Drives Operation & its Converter Circuit and Explain Solar And Battery-Operated Operation of Drives.	BL1REMMBER BL2 UNDERSTAND
HIGH VOLTAGE ENGINEERING (EL415)	**Apply** Electric Fields Fundamentals to Power System & Analyse the Surge Voltage Distribution.	BL3 APPLYBL4ANALYZE
	Derive Various Breakdown Phenomena & Evaluate Practical Considerations in Gases.	BL3 APPLY BL5 EVALUATE
	Understand Conduction & Breakdown in Liquids as Well as Compare Between Liquids & Solids Breakdown	BL1REMEMBER BL4ANALYZE
	Comprehend the Different Techniques of High Voltage Measurement**.**	BL2 UNDERSTAND
	Explain the Process of Testing of Various Apparatus	BL2 UNDERSTAND
	Understand the Use of Various tools and Devices for Sizing & Rating of High Voltage Laboratory	BL1REMEMBER

PROJECT PHASE-I (EL 417)	**Collect** information, understand and describe it.	BL1REMEMBER
	Write technical document to represent and identify the problem	BL3 APPLYBL4ANALYZE
	Show the ability to communicate effectively as an individual.	BL3 APPLY
	Use the techniques, skills and modern tools.	BL3 APPLY
	Understand professional and ethical responsibility.	BL2 UNDERSTANDBL4 ANALYZE

SEMESTER -II		
COURSE NAME & CODE	**COURSE OUTCOME**	**BLOOM'S LEVEL**
POWER QUALITY AND FACTS (EL421-21)	**Explain** the Basic Terms and Standards of Power Quality	BL2 UNDERSTAND
	Elaborate the Harmonics and its Mitigation Method and PQ Monitoring.	BL2 UNDERSTAND
	Explain The Concept Of Facts, Shunt And Series Compensators.	BL2 UNDERSTAND
	Explain TCVR & TCPAR Devices And Combined Controllers (UPFC &IPFC).	BL2 UNDERSTAND
SMART GRID TECHNOLOGY (EL422-21)	**Describe** the Concept of The Smart Grid	BL2 UNDERSTAND
	Explain Communication, Networking, and Sensing Technologies Involved with the Smart Grid	BL2 UNDERSTANDBL3 APPLY
	Execute Power Distribution Sector Framework in Rural India and its Comparison Globally.	BL1REMEMBER BL3 APPLY
	Articulate and Conceptualize the Design of Smart Grid by Selecting Appropriate Communication Technologies, Implementing Smart Meter and Facts	BL2 UNDERSTANDBL4 ANALYZE
	Determine the relevance of Smart Grids Projects, Develop ways to Evaluate their Impacts And Implications	BL2 UNDERSTANDBL3 APPLY
	Elaborate the Renewable Energy and Storage Techniques for the Design of Smart Grid	BL2 UNDERSTANDBL3 APPLY
ELECTRICAL ESTIMATION AND INSTALLATION (EL 423-21)	**To Understand** the Basic Concepts of Safety.	BL2 UNDERSTAND
	Acquire Knowledge of Fundamentals of Electrical Installations like Requirements, Design Considerations, Testing, and Estimating And Costing.	BL3 APPLY
	To Understands Practical Aspects of Condition Monitoring And Maintenance of Various Electrical Equipment's.	BL1REMEMBERBL 2 UNDERSTAND
	To Learn the Testing of Various Electrical Equipment.	BL1REMEMBERBL 2 UNDERSTAND

COURSE NAME & CODE	COURSE OUTCOME	BLOOM'S LEVEL
Extra High Voltage AC Transmission System (EL424-21)	**Analyze** the EHVAC system.	BL2 UNDERSTAND BL4ANALYZE
	Calculate Line inductance and capacitances of bundled conductors	BL2 UNDERSTAND BL3APPLY
	Understand the effect of Radio Interference.	BL2 UNDERSTAND
	Analyze travelling waves	BL2 UNDERSTAND BL4ANALYZE
	Analyze compensated devices for voltage control.	BL2 UNDERSTAND BL4ANALYZE