KLEF

Department of Electrical and Electronics Engineering

Y22 Admitted Batch

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES(POs) and PROGRAM SPECIFIC OUTCOMES (PSOs)

Course Code	Course Title	S	CO NO	Description of the Course Outcome
22UC1101	INTEGRATED PROFESSIONAL ENGLISH	1	CO1	Understand the concepts of grammar to improve communication, reading, and writing skills
		2	CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.
		3	CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices
		4	CO4	Apply the concepts of writing to draft corporate letters, emails, and memos
22UC1202	ENGLISH PROFICIENCY	5	CO1	Demonstrating different interpersonal skills for employability
		6	CO2	Distinguishing business essential skills
		7	CO3	Classifying social media and corporate communication skills
		8	CO4	Applying analytical thinking skills
22UC2103	ESSENTIAL SKILLS FOR EMPLOYABILITY	9	CO1	Developing basic grammar Identify and organize sentence structures based on grammar and apply in writing skills
		10	CO2	Develop effective interpersonal skills, cultivate a positive attitude, apply positive self-talk techniques, and use SWOC analysis to enhance employability.
		11	CO3	Develop drafting skills through Cloze Test, Passage completion, E -mail writing, Paragraph writing, Essay writing
		12	CO4	Develop effective communication skills through JAM and extempore, demonstrating proper email and phone etiquette, and improving listening skills to enhance personal , professional relationships.

22UC2204	CORPORATE COMMUNICATION SKILLS	13	CO1	Extend word power for developing effective speaking and writing skills
		14	CO2	Evaluate coexistence of the “I” with the body
		15	CO3	Identify and associate the holistic perception of harmony at all levels of existence.
		16	CO4	Develop appropriate technologies and management patterns to create harmony in
		17		professional and personal lives.
22UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	18	CO1	Understand and analyse the essentials of human values and skills, self -exploration, happiness, and prosperity
		19	CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.
		20	CO3	Analyze the profession and his role in this existence.
		21	CO4	Understand the profession and his role in this existence
22UC0007	INDIAN HERITAGE AND CULTURE	22	CO1	To familiarize with various aspects of the culture and heritage of India through ages.
		23	CO2	To acquaint with the contributions of Indians in the areas of languages and literature, religion and philosophy
		24	CO3	To understand the Social structure and the spread of Indian culture abroad
		25	CO4	To know the development of Science and Technology in India through ages and to appreciate the contributions of some of the great Indian scientists
22UC0008	INDIAN CONSTITUTION	26	CO1	To acquire knowledge of the historical developments that culminated in the drafting of the Indian Constitution.
		27	CO2	To understand the basic features of the Indian Constitution.
		28	CO3	To understand the structure of the Federal government as defined by the Indian Constitution.
		29	CO4	To understand the Indian Judicial system and election commission of India
22UC0009	ECOLOGY AND ENVIRONMENT	30	CO1	Understand the importance of Environmental education and conservation of natural resources
		31	CO2	Understand the importance of ecosystems and biodiversity

		32	CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process
22UC0011	GENDER & SOCIAL EQUALITY	33	CO1	Students will have developed a better understanding of important issues related to gender in contemporary India
		34	CO2	Students will be sensitized to basic dimensions of the biological, sociological, psychological, and legal aspects of gender. This will be achieved through group discussions.
		35	CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
		36	CO4	Students will acquire insight into the gendered division of labour and its relation to politics and economics.
22UC0011	ENTREPRENEURSHIP	37	CO1	Learn critical elements of entrepreneurship and its development from institution's perspective
		38	CO2	Understand the process of entrepreneurship and its eco system in an educational institute to fit in entrepreneurship zone
		39	CO3	Understand & Learn Design Thinking skills towards product innovation & prototype design
		40	CO4	Evaluate the effectiveness of different entrepreneurial strategies
22MT1101	MATHEMATICS FOR COMPUTING	41	CO1	Model a system of equations for real world applications in engineering, physical and biological sciences, computer science, finance, economics and solve them through matrix algebra
		42	CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional &predicate logic
		43	CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees.
		44	CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management.
		45	CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)

22MT2102	MATHEMATICS FOR ENGINEERS	46	CO1	Apply differential and integral calculus to find maxima & minima of functions, evaluate the integrals and solve the differential equations.
		47	CO2	Demonstrate the Fourier series and Laplace transforms.
		48	CO3	Describe probability, Random Variables
		49	CO4	Explain complex variables, analytic functions and introduction to stochastic process and Algebraic structures.
22EE2104	Mathematical Transforms for Signal Processing	50	CO1	understand basic concepts related to Signals and Systems
		51	CO2	Apply Fourier series and transforms to various periodic and aperiodic waveforms
		52	CO3	Apply Laplace transforms and its properties to various signals
		53	CO4	Apply Z transforms and its properties to various signals
22UC1203	DESIGN THINKING AND INNOVATION-	54	CO1	Understand the importance of Design thinking mindset for identifying contextualized problems
		55	CO2	Analyze the problem statement by empathizing with user
		56	CO3	Develop ideation and test the prototypes made
		57	CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity
22EE3102	Electro Magnetic Fields & Engineering Materials (Science Elective-1)	58	CO1	Apply Coulomb's and Gauss's laws to different electrostatic field distributions
		59	CO2	Apply Biot-Savart's and Ampere's laws to different magnetic field distributions
		60	CO3	Apply the field and force concepts to determine the inductance, capacitance parameters and to estimate boundary conditions.
		61	CO4	Understand the properties of Engineering materials
22CY1001	Engineering Chemistry (Science Elective-2)	62	CO1	Demonstrate materials
		63	CO2	Ilustrate photophysical basis of light absorption and emission by materials
		64	CO3	Sketch the underlying principles of organic light emitting diodes
		65	CO4	Explain the concepts of solar cells modules and memory devices
22SC1101	COMPUTATIONAL THINKING FOR	66	CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm.

	STRUCTURED DESIGN	67	CO2	Translate computational thinking into Logic Design for Solving real world problems.
		68	CO3	ApplyCRUD operations on Basic Data Structures using Asymptotic Notations.
		69	CO4	Apply CRUD operations on Linear Data Structures using Asymptotic Notations.
		70	CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems.
22ME1103	Design Tools Workshop	71	CO1	Demonstrate proficiency in typing sentence , paragraph , report , presentations along spread sheets using office tools, LaTeX tools and PowerBI
		72	CO2	Build a static website and blog with using html along with Special features of HTML5, CSS and Javascript
		73	CO3	Develop a virtual environment with cospace and construct a marker based Augumented Reality and create a 3D terrain
		74	CO4	Utilising the softwares of Autodesk Fusion 360 and the same can be printed in 3D printer as physical prototype, Fundamentals of electrical circuit: Ohms law, KCL and KVL law
22SC1209	IOT Workshop	75	CO1	Demonstration of various Sensors both Analog & Digital for IoT Applications
		76	CO2	Applying & Interfacing various micro controllers with IoT: Micro controllers boards, ESP8266, Peripherals (Motors, Camera, Speaker, Displays), Controlling through Mobile & Web
		77	CO3	Analyze different protocols with IoT Data Communication: Wi-Fi Protocols, Bluetooth, BLE, WSN, Zigbee, RFID, NFC, Client Server, Cloud.
		78	CO4	Design and develop various mini projects using Node MCU, ESP and Raspberry Pi for various applications

22UC3105	Problem Solving Skills-I	79	CO1	Apply the concepts of Linear Equations, concepts of Ratios, Averages, Partnership, Percentages and Interest to solve the problems related to Ages, Ratio & Proportion, Variation& Partnership, Percentages, Profit, Loss& Discounts, Simple & Compound Interest, Averages & Allegations or Mixtures.
		80	CO2	Apply the concepts of Co-primes, Divisibility rules, LCM & HCF concepts to solve problems in Numbers, Apply the concepts of Algebra to solve the problems based on Sets, Relations, Functions and Graphs, Surds & Indices, Logarithms, Quadratic Equations, Inequalities & Progressions.
		81	CO3	Apply Venn diagrams and other applicable diagrams to solve questions in Syllogism, Logical Venn Diagrams, Cubes & Dice. Understand the principles used in forming Number& letter series, Number, letter & word Analogy, Odd man out, Coding & Decoding.
		82	CO4	Understand the underlying assumptions in the arguments presented in the topics: Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives, Binary logic.
22UC3206	Problem Solving Skills-II	83	CO1	Apply the concepts of Unitary method in solving problems in Time & Work, Chain Rule, Pipes & Cisterns. Apply the concept of Average speed and Relative speed to solve the problems related to Time, Speed &Distance, Trains, Boats & Streams, Races & games. Apply the concept of counting principles to solve the problems related to Permutations & Combinations and Probability.

		84	CO2	Apply the concepts of Perimeter, Area, Surface Area & Volume to solve the problems in 2D & 3D Geometry. Apply the concepts of Trigonometry to solve problems related to Heights & Distances. Apply the concepts of Lines, Angles, Triangles, Quadrilaterals & Polygons to solve the problems related to Geometry, Analyzing the data given in the Table, Bar Graph, Pie Chart and Line Graph to solve the problems in Data Interpretation. Data Sufficiency, Statistics, Crypt arithmetic.
		85	CO3	Apply the fundamental relationships and principles in solving questions in Blood Relations, Directions, Clocks, Calendars, Alphabet Test, Number, ranking & Time sequence test, Seating Arrangements, Mathematical Operations, Data Sufficiency, Nonverbal - series, analogy, classification.
		86	CO4	Apply the conditions mentioned in the question statement to solve questions in Input & Output, Assertion and Reason, dot situation. embedded figures, figure matrix, mirror and water images, paper cutting, paper folding pattern completion, rule detection, flowcharts, Puzzles, Sudoku puzzles
22ME1103	DESIGN TOOLS WORKSHOP -I	87	CO1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modeling
		88	CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages
		89	CO3	Understand the concept of report writing using a markup language Latex
		90	CO4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR.
22SC1202	Design of Data Structures	91	CO1	Apply measures of efficiency to algorithms and Compare various linear data structures like Stack ADT, Queue ADT, Linked lists.
		92	CO2	Analyze and compare linear data structures and analyze different searching and hashing techniques

		93	CO3	Analyze and compare various non – linear data structures like Trees and Graphs
		94	CO4	Analyze and compare various sorting algorithms, to select from a range of possible options, to provide justification for that selection, and to implement the algorithm in a particular context.
		95	CO5	Execute lab experiments and develop a small project along with his/her team members.
19EC1202	Computer Organization & Architecture	96	CO1	Understand the functionality and design the CPU functional units - control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections among these components.
		97	CO2	Understand, analyze and design main, cache and virtual memory organizations.
		98	CO3	Understand, analyze and design different types of I/O transfer techniques.
		99	CO4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.
20EE1201	Basic Electrical and Electronic Circuits	100	CO1	Understand the methods to solve electrical circuit using nodal and mesh analysis and apply various network theorems.
		101	CO2	Analyse the various properties of Ac circuits and understand the concept of resonance.
		102	CO3	Understand the active circuit elements and working.
		103	CO4	Understand the applications of semiconductor devices
		104	CO5	Demonstration of various experiments related to basics of electrical and electronics concepts.
22SC1203	Computational Thinking for Object Oriented Programming	105	CO1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply.
		106	CO2	Understand the concepts of constructors, Overloading,parameter passing, access control, Inheritance and apply
		107	CO3	Understand Packages, Interfaces, and Exception Handling and apply.

		108	CO4	Understand I/O Streams & apply and understand Basic Concepts of Multi – Threading
22EC1101	Digital Logic & Processors	109	CO1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding 8design of arithmetic circuitry. Understanding Logic gates, Logic theorems, Boolean algebra and SOP/POS expressions.
		110	CO2	Combinational systems design using standard gates and minimization methods
		111	CO3	Sequential systems: Design of counters using flip flops.
		112	CO4	Understanding PLA's, PAL's, FPGA's and processors
		113	CO5	Analyzing and realization of Boolean functions, half adder, encoders, decoders, flip flops and counters
22EE2101	Electrical Circuits	114	CO1	Understand two port network parameters and their relations
		115	CO2	Analyze the transient behaviour of DC / AC circuits.
		116	CO3	Understand the network topology and apply three phase circuit balanced and unbalanced circuits.
		117	CO4	Understand magnetic circuit behaviour in series and parallel circuits.
22EE2102	Electrical Machines	118	CO1	Understand the basic principles of electro mechanical energy conversion.
		119	CO2	Understand the operating characteristics of various types of DC machines
		120	CO3	Analyze the performance of DC machines.
		121	CO4	Analyze the performance of Transformers.
		122	CO5	Test the performance of DC machines and transformers.
22EE2203	Electrical Power Generation Transmission and Distribution	123	CO1	Understand working of various generating stations and economical aspects of generation
		124	CO2	Understand the parameters of overhead transmission lines and underground cables
		125	CO3	Analyze the performance of overhead transmission lines and AC/DC distribution.
		126	CO4	Understand Mechanical Sag, corona, Insulators and substation layouts.
22EE2201	Analog Electronics	127	CO1	Study of BJT's and Various application in Amplifiers

		128	CO2	Understand various types of FET's, IC Types and analyze FET as an Amplifier
		129	CO3	Understand the Linear & Non-linear application of Op-AMP and analyze active filters
		130	CO4	Analysis of different types of oscillators, filter and regulators.
22EE2202	Industrial Applications of Electrical Machines	131	CO1	Understand the concepts of the 3-phase induction motor.
		132	CO2	Analyze the performance of 3-phase alternator.
		133	CO3	Analyze the performance of 3-phase synchronous motor
		134	CO4	Understand the concepts of 1-phase & special machines.
		135	CO5	Test the performance of AC Rotating Machines
22EE2204	Power Electronics	136	CO1	Select appropriate switch for a given power converter
		137	CO2	Analyze the steady state performance of Basic DC-DC converters
		138	CO3	Analyze the performance of Basic Switch-Mode PWM Inverter
		139	CO4	Understand the operation of basic phase controlled converters
		140	CO5	Test the basic power electronic converters by hardware realization and MATLAB software.
22EE3103	POWER SYSTEM ANALYSIS	141	CO1	Apply the knowledge of network matrices for solution of power flow problems
		142	CO2	Apply the reactance diagrams for Symmetrical short circuit faults in power system
		143	CO3	Apply symmetrical components for unsymmetrical fault analysis in a power system
		144	CO4	Analyze rotor angle stability
22EE3101	Control Systems	145	CO1	Understand the basics of Control system components and its modelling.
		146	CO2	Analyse the control systems under time domain and stability analysis.
		147	CO3	Analyze the control systems under frequency domain analysis.
		148	CO4	Analyze the state space model equations and Understand the control though PLC
		149	CO5	Test the operation of control systems using software & prototype models

22EE3202	POWER SYSTEM PROTECTION &CONTROL	150	CO1	Understand the principle of protective relays & circuit breakers
		151	CO2	Apply overcurrent, distance and differential schemes for the protection of power system equipment
		152	CO3	Analyze over voltage protection and economic operation of power system
		153	CO4	Apply automatic generation control and voltage regulators to control power system
		154	CO5	Experimental verification of characteristics of different Relaysand Operation of power systems
22EE3102	Measurements and Instrumentation	155	CO1	To understand the concepts of Fundamentals of electrical and electronic
		156	CO2	To apply instruments for the measurement of voltage, current in ac and dc measurements
		157	CO3	To apply the various bridge circuits used with measuring instruments, working of sensors and transducers and their applications.
		158	CO4	To apply the concept of digital instrumentation and virtual instrumentation.
22EE3104	AI TECHNIQUES IN ELECTRICAL ENGINEERING	159	CO1	Understand the neural network models, different architectures with different learning types and various algorithms for ANN to solve the load forecasting problems in Power systems
		160	CO2	Apply ANN paradigms in Electrical Engineering
		161	CO3	Apply the fuzzy logic concept, fuzzy sets, with suitable membership function with proper de-fuzzification methods Electrical Engineering
		162	CO4	Apply the different cross over methods and their elitism, convergence of algorithm Electrical Engineering
		163	CO5	Train and test various ANN' s for various applications
22EE3201	Embedded Controllers & Applications	164	CO1	Understand the architecture and programming concepts of 8086 Microprocessor
		165	CO2	Apply the Programming concepts of 8051 Microcontroller

		166	CO3	Analyze the Interfacing of Peripherals to the 8051 Microcontroller through programming. Understand the basic architectures of PIC and ARM 7 microcontrollers
		167	CO4	Understand the basic concepts of CORTEX STM-32 microcontroller and RTOS
		168	CO5	Analyze the applications of programming with 8051 and 8086 on hardware / software. Analyze the applications of programming with Arduino
22EE3111	Industrial Automation and Robotics	169	CO1	Understand the automation basics and components
		170	CO2	Understand the automation process control
		171	CO3	Understand the fundamentals of Industrial Robots
		172	CO4	Understand the robotic end effectors and Sensors
22EE3112	Introduction to Industrial Internet of Things(IIOT)	173	CO1	Understand the Industry 4.0 Globalization
		174	CO2	Understand the Model and architecture of IIOT
		175	CO3	Understand the IIoT Computing
		176	CO4	Understand the Various Applications of IIoT
		177	CO5	Apply IIOT Systems Programming IO interfacing with various applications
22EE3113	Industrial Drives and Control	178	CO1	Understand Basics of Electric Drives and Dynamics
		179	CO2	Understand Closed loop control of DC drives
		180	CO3	Understand the Control schemes of BLDC motors
		181	CO4	Understand the Programmable control of Drives
22EE3211	Industrial Communication Protocols & Cyber Security	182	CO1	Understand thecommunication technology protocols & standards
		183	CO2	Understand the information security and measurement technology
		184	CO3	Understand the introduction to cyber crime
		185	CO4	Understand the hacking and cyber-security models
22EE3212	Smart Sensors and Sensor Networking	186	CO1	Understand the basics of smart sensors and micromachining
		187	CO2	Understand the sensor communication:
		188	CO3	Understand the packaging, testing and reliability of smart sensors:

		189	CO4	Understand the wireless sensor networks:
		190	CO5	Demonstrate various experiments related to basics of smart sensors and sensor networking
22EE3121	Solar PV and Micro-Energy Technologies	191	CO1	Interpret principles and control of Solar PV Energy system
		192	CO2	Model and Select Solar PV energy system components
		193	CO3	Interpret and Model dynamics of fuel cell energy conversion
		194	CO4	Demonstrate ultra-micro-energy energy conversion technologies
22EE3122	Wind and Energy Storage Technologies	195	CO1	Interpret principles and control of Wind Energy Conversion
		196	CO2	Model and Select Solar Wind energy conversion system components
		197	CO3	Interpret and Model Electro-chemical energy storage components
		198	CO4	Interpret and Model Mechanical energy storage components
22EE3123	ENERGY MANGEMENT AND GREEN BUILDINGS	199	CO1	Apply energy audit for energy management in buildings
		200	CO2	Interpret energy conservation opportunities in electrical systems
		201	CO3	Identify energy management strategies for energy efficiency
		202	CO4	Identify practices for energy efficiency green buildings
22EE3132	Distribution System Practices	203	CO1	Understand the basic structure of distribution system and compute AT&C loss.
		204	CO2	Apply the knowledge for erection and commissioning of a substation.
		205	CO3	Understand the various protection systems deployed in distribution system.
		206	CO4	Test and understand the test results of various distribution system equipment.
		207	CO5	Ability to analyze the best distribution system practices in the microgrid
22EE3131	Distributed Energy Resources and Smart Grids	208	CO1	Understand different types of distributed energy resources
		209	CO2	Apply the principles for integrating DERs to grid
		210	CO3	Understand smart grid objectives and its activities in India
		211	CO4	Monitor various applications in smart grid with its smart infrastructure.
22EE3133		212	CO1	Understand SCADA and its architecture.

	Energy Management Systems and SCADA	213	CO2	Understand the application of SCADA in various utilities.
		214	CO3	Apply the knowledge in analyzing various real time applications on transmission side.
		215	CO4	Apply the knowledge in analyzing various real time applications on distribution side.
22EE3211	Smart Grid Communication and Cybersecurity	216	CO1	Understand the communication technologies for smart grid
		217	CO2	Analyze the information security of smart grid and measurement technologies
		218	CO3	Understand the substation standards for communication
		219	CO4	Analyze the hacking and cybersecurity aspects in smart grids
22EE3232	INTERNET OF THINGS AND SMART GRID ANALYTICS	220	CO1	Understand network protocols and standards
		221	CO2	Analyze IoT architecture and data analytics archeitecture
		222	CO3	Anderstand various applications of IoT to to Smart Grids
		223	CO4	Analyze the Big Data Analytics
		224	CO5	Analyze IoT modules and data analytics for smart grid
22EE3141	POWER TRAIN DESIGN FOR ELECTRIC VEHICLE	225	CO1	Understand the History, Economics, Environmental issues and power train of Electric Vehicles
		226	CO2	Analyze the dynamics of EV
		227	CO3	Select and size the power train for 2W
		228	CO4	Select and size the power train for 4W
22EE3142	BATTERY STATE ESTIMATION ALGORITHMS FOR ELECTRIC VEHICLE	229	CO1	Understand the specifications and Li-ion chemistry
		230	CO2	Understand the key functions of Battery management systems
		231	CO3	Develop Enhanced Self Correcting (ESC) Model of battery
		232	CO4	Develop Algorithms for SOC estimation of battery
22EE3143	CHARGING STATION FOR ELECTRIC VEHICLE	233	CO1	Interpret Power electronic converters for electric vehicle charging
		234	CO2	Develop control algorithms for various electric vehicle charging modes
		235	CO3	Demonstrate charging station infrastructure
		236	CO4	Demonstrate installation of charging station

		237	CO5	Analyze the converters and control algorithms using Matlab
22EE3241	AI and IOT FOR EV	238	CO1	Understand various AI open source tools
		239	CO2	Understand various IOT open source tools
		240	CO3	Apply AI and IOT for EV performance management
		241	CO4	Apply AI and IOT for online vehicle assistance
		242	CO5	Apply sensors and embedded programming for cloud data monitoring for electrical vehicle parameters
22EE3242	Communication protocols and Testing of EV	243	CO1	Understand the communication protocols used in Electric Vehicles
		244	CO2	Apply the communication protocols for fault diagnostics of Electric Vehicle
		245	CO3	Analyzethe intricacies of integrating HV and LV components of vehicle
		246	CO4	Understand the overview of system engineering/system validation
		247	CO5	Test electric vehicle fault
22EE3221	AI and IoT for Green Energy Integration	248	CO1	Understand various AI open source tools
		249	CO2	Understand various IoT open source tools
		250	CO3	Apply AI and IoT for PV energy prediction
		251	CO4	Apply AI and IoT for Wind Energy Prediction
		252	CO5	Apply AI and IoT technologies for green energy integration solutions
22EE3222	Grid Integration of Renewable Energy Sources	253	CO1	Understand Grid code for integrating PV and Wind power
		254	CO2	Identify topologies and interpret control of PV integration to grid
		255	CO3	Identify topologies and interpret control of Wind power integration to grid
		256	CO4	Identify issues and Model active gird management for renewable integration
		257	CO5	Able to apply the integration of micro grid
22EE3105	Restructured Power Systems	258	CO1	Understand the concept of deregulated market structures and reforms in Indian Power Sector
		259	CO2	Apply different techniques for finding available transfer capacity for congestion management
		260	CO3	Analyze transmission pricing methods and effect of congestion on LMPs
		261	CO4	Understand ancillary services and system security in deregulation
22EE2205	Power Quality	262	CO1	Understand various power quality issues.

		263	CO2	Analyze various power quality issues and its causes.
		264	CO3	Apply different mitigating techniques for improving power quality
		265	CO4	Analyze voltage sag and swell using simulation tools.
22EE3224	Floating Solar and Off-Shore Wind Technologies	266	CO1	Understand the selection of floating solar power plant
		267	CO2	Understand different layouts and selection of converters
		268	CO3	Understand the operation of off shore wind power plants
		269	CO4	Analyze the operation of floating solar and off shore power system
22EE3234	Wide Area Monitoring & Control	270	CO1	Understand the concepts of real-time computer control of power systems and wide area measurement systems
		271	CO2	Apply Phasor Measurement Units for reliable Operation of Power System
		272	CO3	Apply Fault Detection Isolation Restoration (FDIR) Concepts for Protection.
		273	CO4	Understand voltage stability concepts for Wide area protection.
22EE4133	Smart Appliances and Smart Cities	274	CO1	Apply smart city principles
		275	CO2	Apply smart device design principles
		276	CO3	Apply IoT systems for smart city
		277	CO4	Apply Data processing and application development using smart devices
22EE4123	Microgrid Dynamics and Control	278	CO1	Analyze challenges in microgrids
		279	CO2	Analyze dynamics of micro grids
		280	CO3	Analyze hierarchical microgrid control
		281	CO4	Analyze DC microgrids
22EE3244	Switched Mode Power Supply Design	282	CO1	Analyze Power converters for Switched mode power supply
		283	CO2	Design components for switched mode power supply
		284	CO3	Analyze output stage operation of SMPS
		285	CO4	Design resonant SMPS
22EE4143	Advanced Electrical Drives	286	CO1	Analyze Mathematical Models of AC machines
		287	CO2	Contrast the speed control performance of 3-Phase induction and synchronous motor drive using vector control methods
		288	CO3	Analyze the dynamic behavior of SRM motor drives under various control methods

		289	CO4	Analyze the performance of BLDC Motor drive using various control techniques
22EE3214	Data Science Application for Automation	290	CO1	Understand basics of data science
		291	CO2	Understand the big data handling in automation
		292	CO3	Apply the data handling techniques using pyhton
		293	CO4	Apply the numpy and panda models
22EE4113	Machine Learning Applications for Automation	294	CO1	Understand basic AI algorithms
		295	CO2	Understand the AI & ML concepts
		296	CO3	Apply the ML algorithms for automation data
		297	CO4	Understand the system expers in automation model
22EE4124	Microgrids	298	CO1	Understand the concept of Microgrid
		299	CO2	Apply the various communications in microgrid
		300	CO3	Apply smart metering technology
		301	CO4	Apply energy management in microgrids
22EE3215	Foundations of Cyber Physical Systems	302	CO1	Understand the CPS basics
		303	CO2	Understand the CPS software Components
		304	CO3	Understand the security and safety in CPS
		305	CO4	Understand the deployment of CPS model
22EE3216	CPS Network & Protocols	306	CO1	Understand the concepts required for building industrial systems
		307	CO2	Understand the network bud architectures and protocols
		308	CO3	Understand the CPS Architecture & Enabling Technologies
		309	CO4	Understand the CPS security models
22EE4114	Cyber Security	310	CO1	To introduce students to the fundamental concepts of cyber crime, including target identification, vulnerabilities, attack tools, and methods.
		311	CO2	To equip students with knowledge about authentication, secure password generation, encryption, digital signatures, and cybersecurity standards.
		312	CO3	Apply safe practices while using social networking platforms, including protecting personal information, email security, and participating in groups and communities.
		313	CO4	To raise awareness about smartphone security, secure communication methods, and precautions for maintaining privacy while using smartphones.

22EE4133	Data Science Applications for Smart Grid	314	CO1	Understand the integration of data science techniques in smart grid systems.
		315	CO2	Apply data analysis for optimizing energy consumption and distribution in smart grids
		316	CO3	Employ machine learning algorithms for predictive maintenance and load forecasting
		317	CO4	Analyze case studies to grasp practical applications of data science in smart grids
		318	CO5	Analyze the modules of data science in smart grids
22EE3112	Introduction to Industrial Internet of Things	319	CO1	Understand the Industry 4.0 Globalization
		320	CO2	Understand the Model and architecture of IIOT
		321	CO3	Understand the IIoT Computing
		322	CO4	Understand the Various Applications of IIOT
		323	CO5	Apply IIOT Systems Programming IO interfacing with various applications
22EE2191	HVDC & FACTs	324	CO1	Understand various HVDC transmission systems converter circuits and its control scheme
		325	CO2	Analyze the FACTS devices for improving system stability
		326	CO3	Analyze the knowledge for improving stability in Power System
		327	CO4	Apply the concepts of harmonics for designing of AC filters
22EE3181	Non-Isolated Poower Converters	328	CO1	Understand operation principle of Power Switches
		329	CO2	Apply the Principles of ac-dc converters
		330	CO3	Analyze dc-dc conversion circuits
		331	CO4	Analyze the Principles of dc-ac conversion circuits
OEEE0013	RENEWABLE ENERGY SOURCES(RES)	332	CO1	Utilize the different solar thermal applications and solar photovoltaic cells
		333	CO2	Identify different types of wind turbines and wave energy conversion
		334	CO3	Apply various energy conversion techniques of Tidal, ocean thermal and geo thermal power plants
		335	CO4	Develop Bio energy conversion method and bio gas plants
OEEE0014	ENERGY ESTIMATION AND AUDIT	336	CO1	Understand the present power scenario in India and need for energy estimation and Audit.

		337	CO2	Utilize the Induction motor for energy conservation opportunities.
		338	CO3	Select the transformers and cables for energy conservation opportunities.
		339	CO4	Select the Lighting systems, pumping systems for energy conservation opportunities.
OEEE0015	ELECTRICAL POWER TECHNOLOGY	340	CO1	Understand working of various generating stations and economical aspects of generation
		341	CO2	Apply the Kirchhoff's laws for calculating circuit parameters
		342	CO3	Apply the faraday's laws for the construction and performance analysis of different types of electrical machines
		343	CO4	Apply energy conservation opportunities for various electrical appliances