

KLEF
DEPARTMENT OF EEE
Y21 ADMITTED B.TECH EEE

SNO	Course Code	Course Title	CO NO	Description of the Course Outcome
1	20UC1101	INTEGRATED PROFESSIONAL ENGLISH	CO1	Understand the concepts of grammar to improve communication, reading, and writing skills
			CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.
			CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices
			CO4	Apply the concepts of writing to draft corporate letters, emails, and memos
2	20UC1202	ENGLISH PROFICIENCY	CO1	Demonstrating different interpersonal skills for employability
			CO2	Distinguishing business essential skills
			CO3	Classifying social media and corporate communication skills
			CO4	Applying analytical thinking skills
3	21UC2103	Essential Skills for Employability	CO1	Developing critical and analytical reading skills
			CO2	Discovering different interpersonal skills to develop people skills
			CO3	To enhance the problem-solving skills of the students through the concepts of Simple Equations, Ratio, Proportion & Variation, Percentages, Profit & Loss, Averages, Allegations, Simple & Compound Interest.
			CO4	Apply diagrammatic representation of the given data to find the possible outcomes in the topics of Deductions, Cubes, Venn Diagrams and Arrangements
4	21UC2204	Corporate Readiness Skills	CO1	To distinguish product and process and quote them in speaking and writing activities
			CO2	To apply interpersonal skills
			CO3	To enhance the problem-solving skills of the students through the concepts of Numbers, Time & Work, Time & Distance, Permutations & Combinations, Probability which will enable them to improve their problem solving abilities which in turn improve their programming skills.
			CO4	To apply known facts to find the unknowns in the topics Clocks, Calendars, Binary Logic. Identify the rule set by analyzing the given observations in the topics Series, Analogy, Odd Man, Coding-Decoding
5	21UC3105	Problem Solving Skills I	CO1	To discuss and interpret English language skills necessary for placements
			CO2	To demonstrate skills to get selected in interviews and retain job
			CO3	To enhance the problem-solving skills of the students through the concepts of Mensuration, Quadratic Equations & Inequalities, Progressions, Logarithms, Data Interpretation, Data Sufficiency which will enable them to improve their problem-solving abilities which in turn improve their programming skills.
			CO4	To apply deductive logic to solve questions in Connectives, Blood relations, Ranking and time sequence, Symbols and notations. Apply principles of reflection and rotation to solve picture puzzles.
6	20UC0007	INDIAN HERITAGE AND CULTURE	CO1	To familiarize with various aspects of the culture and heritage of India through ages.
			CO2	To acquaint with the contributions of Indians in the areas of languages and literature, religion and philosophy
			CO3	To understand the Social structure and the spread of Indian culture abroad
			CO4	To know the development of Science and Technology in India through ages and to
7	20UC0008	INDIAN CONSTITUTION	CO1	To understand Constitutional development after Independence
			CO2	To learn the fundamental features of the Indian Constitution
			CO3	To get a brief idea of the powers and functions of Union and State Governments
			CO4	To understand the basics of working of Indian Judiciary and the Election Commission
8	20UC0009	ECOLOGY AND ENVIRONMENT	CO1	Understand the importance of Environmental education and conservation of natural resources.
			CO2	Understand the importance of ecosystems and biodiversity
			CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process

			CO4	Understand the importance of Environmental education and conservation of natural resources
9	21UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	CO1	Understand and identify the basic aspiration of human beings
			CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.
			CO3	Analyze the profession and his role in this existence.
10	20UC0011	ENTREPRENEURSHIP	CO1	Analyze the business environment in order to identify business opportunities,
			CO2	Identify the elements of success of entrepreneurial ventures
			CO3	Consider the legal and financial conditions for starting a business venture
			CO4	Evaluate the effectiveness of different entrepreneurial strategies
11	20MT1101	MATHEMATICS FOR COMPUTING	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
			CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional & predicate logic
			CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees.
			CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management.
			CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)
12	20SC1102	INTRODUCTION TO DESIGN	CO1	Be able to understand elements and principles of design
			CO2	Able to grasp stage model of action cycle
			CO3	Be able to understand design laws and their importance in design field
			CO4	To comprehend various rules of composition of design
			CO5	To gain hands-on experience of fundamentals of design
13	21MT2102	MATHEMATICS FOR ENGINEERS	CO1	Apply differential and integral calculus to find maxima & minima of functions, evaluate the integrals and solve the differential equations.
			CO2	Demonstrate the Fourier series and Laplace transforms.
			CO3	Describe probability, Random Variables
			CO4	Explain complex variables, analytic functions and introduction to stochastic process and Algebraic structures.
14	20EE2104	Mathematical Transforms for Signal Processing	CO1	understand basic concepts related to Signals and Systems
			CO2	Apply Fourier series and transforms to various periodic and aperiodic waveforms
			CO3	Apply Laplace transforms and its properties to various signals
			CO4	Apply Z transforms and its properties to various signals
16	21UC1203	Design Thinking and Innovation	CO1	Understand the basics of design thinking and its implications in product or service development
			CO2	Understand and Analyze the requirements of a typical problem
			CO3	Plan the necessary activities towards solving the problem through ideation and prototyping
			CO4	evaluate the solution and refine them based on the customer feedback
18	20EE2101	Electrical Circuits	CO1	Understand two port network parameters and their relations
			CO2	Analyze the transient behaviour of DC / AC circuits.
			CO3	Understand the network topology and apply three phase circuit balanced and unbalanced circuits.
			CO4	Understand magnetic circuit behaviour in series and parallel circuits.
19	21EE2103	Electromagnetic Fields and Engineering Materials (Science Elective-2)	CO1	Apply Coulomb's and Gauss's laws to different electrostatic field distributions
			CO2	Apply Biot-Savart's and Ampere's laws to different magnetic field distributions
			CO3	Understand force existence in different field distributions and inductance phenomenon
			CO4	Apply Maxwell's equations for time varying fields
			CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm.
			CO2	Translate computational thinking into Logic Design for Solving real world problems.

21	21SC1101	COMPUTATIONAL THINKING FOR DESIGN	CO3	Apply and Analyse CRUD operations on Basic Data Structures using Asymptotic Notations.
			CO4	Apply and Analyse CRUD operations on Linear Data Structures using Asymptotic Notations.
			CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems.
22	20ME1103	DESIGN TOOLS WORKSHOP -I	CO1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modeling
			CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages
			CO3	Understand the concept of report writing using a markup language Latex
			CO4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR.

23	21SC1202	Data Structures	CO1	Apply measures of efficiency to algorithms and Compare various linear data structures like Stack ADT, Queue ADT, Linked lists.
			CO2	Analyze and compare linear data structures and analyze different searching and hashing techniques
			CO3	Analyze and compare various non – linear data structures like Trees and Graphs
			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.
			CO5	Execute lab experiments and develop a small project along with his/her team members.
24	20SC1203	Object Oriented Programming	CO1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply.
			CO2	Understand the concepts of constructors, Overloading,parameter passing, access control, Inheritance and apply
			CO3	Understand Packages, Interfaces, and Exception Handling and apply.
			CO4	Understand I/O Streams & apply and understand Basic Concepts of Multi –Threading
26	21SC1209	DESIGN TOOLS WORKSHOP -II	CO1	Practice the design ideology by artistic skill
			CO2	Visualize the design ideology by using VR technology
			CO3	Visualize the design ideology by incorporating VR technique
			CO4	Visualize and present his design idea by applying AR technique
27	21EC1101	Digital Logic & Processors	CO1	Describe the concepts of number systems with codes and logic gates usage in digital circuit design and identify the logical expressions in different forms and their minimization techniques for logical circuit optimization. Code conversions and digital IC's realization with respect to data sheets
			CO2	Employ combinational logic circuits with minimization techniques and logical verification through hardware description language
			CO3	Substantiation of sequential logic circuits and logical verification through hardware description language
			CO4	Implementation of digital circuits using PAL, PLA and FPGA. Discriminate the operations of ALU and execution of microinstructions.
			CO5	Analyse the digital IC logic for combinational and sequential circuits implementation
28	21EC1202	Computer Organization &Architecture	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.
			CO2	Understand, analyze and design main, cache and virtual memory organizations.
			CO3	Understand, analyze and design different types of I/O transfer techniques.
			CO4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.
29	20EE1201	Basic Electrical and Electronic Circuits	CO1	Understand the methods to solve electrical circuit using nodal and mesh analysis and apply various network theorems.
			CO2	Analyse the various properties of Ac circuits and understand the concept of resonance.
			CO3	Understand the active circuit elements and working.
			CO4	Understand the applications of semiconductor devices
			CO5	Demonstration of various experiments related to basics of electrical and electronics concepts.
30	21EE2201	Analog Electronics	CO1	Study of BJT's and Various application in Amplifiers
			CO2	Understand various types of FET's, IC Types and analyze FET as an Amplifier
			CO3	Understand the Linear & Non-linear application of Op-AMP and analyze active filters
			CO4	Analysis of different types of oscillators, filter and regulators.
31	21EE3202	Embedded Controllers & Applications	CO1	Understand the architecture and programming concepts of 8086 Microprocessor
			CO2	Apply the Programming concepts of 8051 Microcontroller
			CO3	Analyze the Interfacing of Peripherals to the 8051 Microcontroller through programming. Understand the basic architectures of PIC and ARM 7 microcontrollers
			CO4	Understand the basic concepts of CORTEX STM-32 microcontroller and RTOS
			CO5	Analyze the applications of programming with 8051 and 8086 on hardware / software. Analyze the applications of programming with Arduino

32	21EE2203	Electrical Power Generation, Transmission & Distribution	CO1	Understand working of various generating stations and economical aspects of generation
			CO2	Understand the parameters of overhead transmission lines and underground cables
			CO3	Analyze the performance of overhead transmission lines and AC/DC distribution.
			CO4	Understand Mechanical Sag, corona, Insulators and substation layouts.

33	21EE2102	Electrical Machines	CO1	Understand the basic principles of electro mechanical energy conversion.
			CO2	Understand the operating characteristics of various types of DC machines
			CO3	Analyze the performance of DC machines.
			CO4	Analyze the performance of Transformers.
			CO5	Test the performance of DC machines and transformers.
34	21EE2202	Industrial Applications of Electrical Machines	CO1	Understand the concepts of the 3-phase induction motor.
			CO2	Analyze the performance of 3-phase alternator.
			CO3	Analyze the performance of 3-phase synchronous motor
			CO4	Understand the concepts of 1-phase & special machines.
			CO5	Test the performance of AC Rotating Machines
35	21EE2204	Power Electronics	CO1	Select appropriate switch for a given power converter
			CO2	Analyze the steady state performance of Basic DC-DC converters
			CO3	Analyze the performance of Basic Switch-Mode PWM Inverter
			CO4	Understand the operation of basic phase controlled converters
			CO5	Test the basic power electronic converters by hardware realization and MATLAB software.
37	21EE2204	Control Systems	CO1	Understand the basics of Control system components and its modelling.
			CO2	Analyse the control systems under time domain and stability analysis.
			CO3	Analyze the control systems under frequency domain analysis.
			CO4	Analyze the state space model equations and Understand the control through PLC
			CO5	Test the operation of control systems using software & prototype models
38	21EE3104	AI TECHNIQUES IN ELECTRICAL ENGINEERING	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
			CO2	Apply ANN paradigms in Electrical Engineering
			CO3	Apply the fuzzy logic concept, fuzzy sets, with suitable membership function with proper de-fuzzification methods Electrical Engineering
			CO4	Apply the different cross over methods and their elitism, convergence of algorithm Electrical Engineering
			CO5	Train and test various ANN' s for various applications
44	21EE3211	Industrial Automation and Robotics	CO1	Understand the automation basics and components
			CO2	Understand the automation process control
			CO3	Understand the fundamentals of Industrial Robots
			CO4	Understand the <u>robotic end effectors and Sensors</u>
45	21EE3212	Introduction to Industrial Internet of Things(IIoT)	CO1	Understand the Industry 4.0 Globalization
			CO2	Understand the Model and architecture of IIoT
			CO3	Understand the IIoT Computing
			CO4	Understand the Various Applications of IIoT
46	21EE3213	Industrial Drives and Control	CO1	Understand Basics of Electric Drives and Dynamics
			CO2	Understand Closed loop control of DC drives
			CO3	Understand the Control schemes of BLDC motors
			CO4	Understand the Programmable control of Drives
47	21EE4111	Industrial Communication Protocols & Cyber Security	CO1	Understand the communication technology protocols & standards
			CO2	Understand the information security and measurement technology
			CO3	Understand the introduction to cyber crime
			CO4	Understand the hacking and cyber-security models
48	21EE4112	Smart Sensors and Sensor Networking	CO1	Understand the basics of smart sensors and micromachining
			CO2	Understand the sensor communication:
			CO3	Understand the packaging, testing and reliability of smart sensors:
			CO4	Understand the wireless sensor networks:
49	21EE3221	Solar PV and Micro-Energy Technologies	CO1	Interpret principles and control of Solar PV Energy system
			CO2	Model and Select Solar PV energy system components
			CO3	Interpret and Model dynamics of fuel cell energy conversion
			CO4	Demonstrate ultra-micro-energy energy conversion technologies

50	21EE3222	Wind and Energy Storage Technologies	CO1	Interpret principles and control of Wind Energy Conversion
			CO2	Model and Select Solar Wind energy conversion system components
			CO3	Interpret and Model Electro-chemical energy storage components
			CO4	Interpret and Model Mechanical energy storage components

51	21EE3223	ENERGY MANGEMENT AND GREEN BUILDINGS	CO1	Apply energy audit for energy management in buildings
			CO2	Interpret energy conservation opportunities in electrical systems
			CO3	Identify energy management strategies for energy efficiency
			CO4	Identify practices for energy efficiency green buildings
52	21EE3231	Distribution System Practices	CO1	Understand the basic structure of distribution system and compute AT&C loss.
			CO2	Apply the knowledge for erection and commissioning of a substation.
			CO3	Understand the various protection systems deployed in distribution system.
			CO4	Test and understand the test results of various distribution system equipment.
53	21EE3232	Distributed Energy Resources and Smart Grids	CO1	Understand different types of distributed energy resources
			CO2	Apply the principles for integrating DERs to grid
			CO3	Understand smart grid objectives and its activities in India
			CO4	Monitor various applications in smart grid with its smart infrastructure.
54	21EE3233	Energy Management Systems and SCADA	CO1	Understand SCADA and its architecture.
			CO2	Understand the application of SCADA in various utilities.
			CO3	Apply the knowledge in analyzing various real time applications on transmission side.
			CO4	Apply the knowledge in analyzing various real time applications on distribution side.
55	22EE4131	Smart Grid Communication and Cybersecurity	CO1	Understand the communication technologies for smart grid
			CO2	Analyze the information security of smart grid and measurement technologies
			CO3	Understand the substation standards for communication
			CO4	Analyze the hacking and cybersecurity aspects in smart grids
56	21EE4132	INTERNET OF THINGS AND SMART GRID ANALYTICS	CO1	Understand network protocols and standards
			CO2	Analyze IoT architecture and data analytics archeitecture
			CO3	Anderstand various applications of IoT to to Smart Grids
			CO4	Analyze the Big Data Analytics
57	21EE4141	POWER TRAIN DESIGN FOR ELECTRIC VEHICLE	CO1	Understand the History, Economics, Environmental issues and power train of Electric Vehicles
			CO2	Analyze the dynamics of EV
			CO3	Select and size the power train for 2W
			CO4	Select and size the power train for 4W
58	21EE3242	BATTERY STATE ESTIMATION ALGORITHMS FOR ELECTRIC VEHICLE	CO1	Understand the specifications and Li-ion chemistry
			CO2	Understand the key functions of Battery management systems
			CO3	Develop Enhanced Self Correcting (ESC) Model of battery
			CO4	Develop Algorithms for SOC estimation of battery
59	21EE3243	CHARGING STATION FOR ELECTRIC VEHICLE	CO1	Interpret Power electronic converters for electric vehicle charging
			CO2	Develop control algorithms for various electric vehicle charging modes
			CO3	Demonstrate charging station infrastructure
			CO4	Demonstrate installation of charging station
60	21EE4141	AI and IOT FOR EV	CO1	Understand various AI open source tools
			CO2	Understand various IOT open source tools
			CO3	Apply AI and IOT for EV performance management
			CO4	Apply AI and IOT for online vehicle assistance
61	21EE4142	Communication protocols and Testing of EV	CO1	Understand the communication protocols used in Electric Vehicles
			CO2	Apply the communication protocols for fault diagnostics of Electric Vehicle
			CO3	Analyzethe intricacies of integrating HV and LV components of vehicle
			CO4	Understand the overview of system engineering/system validation
62	21EE4121	AI and IoT for Green Energy Integration	CO1	Understand various AI open source tools
			CO2	Understand various IoT open source tools
			CO3	Apply AI and IoT for PV energy prediction
			CO4	Apply AI and IoT for Wind Energy Prediction
63	21EE4122	Grid Integration of Renewable Energy Sources	CO1	Understand Grid code for integrating PV and Wind power
			CO2	Identify topologies and interpret control of PV integration to grid
			CO3	Identify topologies and interpret control of Wind power integration to grid
			CO4	Identify issues and Model active gird management for renewable integration