



# Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.

Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in

Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Internet of Things

Program: B.Tech -Internet of Things

Academic Year :2022-2023

COURSE CODE	COURSE NAME	CO NO	Description of the Course Outcome
22UC1101	Integrated Professional English	CO1	Understand the concepts of grammar and to improve communication skills in reading and writing.
		CO2	Demonstrate the ability in interactive skills of speaking and writing that are better suited for corporate environment.
		CO3	Understand various strategies of reading and use them in interpreting the text.
		CO4	Apply the concepts of writing to draft corporate letters, emails and memos, reports, etc.
22UC1202	English Proficiency	CO1	Demonstrating different inter personal skills for employability
		CO2	Distinguishing business essential skills
		CO3	Classifying social media and corporate communication skills
		CO4	Applying analytical thinking skills
22UC2103	Essential Skills for Employability	CO1	Identify and organize sentence structures based on grammar
		CO2	Illustrate specific writing styles
		CO3	Relate intra personal skills
		CO4	Interpret inter personal Skills for developing oral communication
22UC2204	Corporate Readiness Skills	CO1	Extend word power for developing effective speaking and writing skills
		CO2	Differentiate critical and general reading skills
		CO3	Interpret interpersonal skills
		CO4	Demonstrate necessary skills to be employable
22UC0010	Universal Human Values & Professional Ethics	CO1	Realize and Understand the basic aspiration, harmony in the human being.
		CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.
		CO3	Analyze the profession and his role in this existence
		CO4	Understand the profession and his role in this

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			existence
22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	CO1	Familiarizing students with various aspects of Indian culture and how they contribute to the concept of Unity in Diversity
		CO2	Understand the beginnings of Indian History and the developments during the Ancient period
		CO3	Understand the developments in India during the Medieval Age along with how they contributed to Indian civilization
		CO4	Understand the reasons for colonial rule over India and how independence was achieved from British rule
22UC0008	Indian Constitution	CO1	To acquire knowledge of the historical developments that culminated in the drafting of the Indian Constitution.
		CO2	To understand the basic features of the Indian Constitution.
		CO3	To understand the structure of the Federal government as defined by the Indian Constitution.
		CO4	To understand the Indian Judicial system and election commission of india
22UC0009	Ecology & Environment	CO1	Understanding the importance of Environmental education and conservation of natural resources
		CO2	Understanding the Ecosystems, biodiversity
		CO3	Understand global Environmental issues, pollution
		CO4	Understand the knowledge on solid waste management, disaster management and EIA process
22UC0016	Gender Sensitization	CO1	Develop a better understanding of important issues related to gender in contemporary India
		CO2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender.
		CO3	Attain a finer grasp of how gender discrimination works in our society and how to counter it.
		CO4	Acquire insight into the gendered division of labor and its relation to politics and economics.

  
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22MT1101	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)
22MT2102	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 processes and Algebraic structures.
22MT2005	PROBABILITY, STATISTICS & QUEUEING THEORY	CO1	understand the terminologies of basic probability, two types of random variables and their probability functions
		CO2	observe and analyze the behaviour of various discrete and continuous probability distributions
		CO3	understand the central tendency, correlation and correlation coefficient and also regression
		CO4	apply the statistics for testing the significance of the given large and small sample data by using t- test, F- test and Chi-square test
		CO5	Implement probability and statistics using R language
22MT2004	MATHEMATICAL PROGRAMMING	CO1	Apply various methods for finding the optimal solution of Linear Programming Problem.
		CO2	Apply Integer and Fractional programming approaches for solving optimization problems.
		CO3	To express a practical problem, such as an engineering analysis or design problem and to optimize a multivariate quadratic function

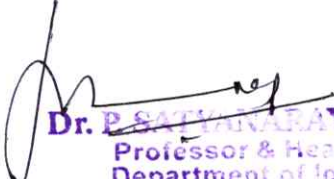


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			subject to linear constraints on the variables.
		CO4	To apply and understand the search and optimization methodologies applicable to the resolution of multi-disciplinary decision problems, under a decision support framework.
22UC1203	Design Thinking and Innovation	CO1	Understand the importance of Design thinking process for contextualized problems
		CO2	Analyze, define, and ideate for solutions
		CO3	Develop and test the prototype made
		CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity
22CY1001	Engineering Chemistry	CO1	Predict potential complications from combining various chemicals or metals in an engineering setting
		CO2	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena
		CO3	Examine water quality and select appropriate purification technique for intended problem
		CO4	Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behavior and observable physical properties.
		CO5	An ability to analyze and generate experimental skills
22UC3108	PROBLEM SOLVING AND REASONING SKILLS1	CO1	Apply the concepts of mathematical principles besides logic and identifying certain basic mathematical formulae to solve these kinds of problems
		CO2	Formulate the concepts of mathematical principles of equations that contain the data related to real life situations which requires basic logic to analyze
		CO3	Solve concepts of Venn diagrams and number patterns and illustrate logic behind connectives, series, and analogies respectively
		CO4	Differentiate assumptions and arguments in critical reasoning

  
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22UC3109	PROBLEM SOLVING AND REASONING SKILLS2	CO1	Implement problem solving ability through analyzing the given data and formulate solutions for real world problems based on time, travel and wages
		CO2	Determine the fundamental concepts of areas, volumes and derive solutions using simple mathematical principles besides interpreting the data through smart tricks to check the number analytics
		CO3	Estimate inductive reasoning, to categorize the rules-set from a given list of observations and relate them to predict the conclusions according to the given conditions
		CO4	Integrate verbal and non-verbal reasoning and to identify the logic behind the given arrangement based on the given conditions to bring out the possible outcome
22SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CO1	Design Basic and Complex Building Blocks for real world problems using a structured programming paradigm
		CO2	Translate computational thinking into Logic Design for Solving real world
		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
		CO6	Skill the students in such a way that students will be able to develop logic that help them to create programs as well as applications in C
221EC1101	DIGITAL LOGIC AND PROCESSORS	CO 1	Understand numerical and character representations in digital logic,number system, data codes and the corresponding design of arithmetic circuitry. Understanding Logic gates, Logic theorems, Boolean algebra and OP/POS'S expressions.
		CO 2	Combinational systems design using standard gates and minimization methods
		CO 3	Sequential systems: Design of counters using flip flops.
		CO 4	Understanding PLA's, PAL's, FPGA's, and processors

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		CO5	Analysing and realization of Boolean functions, half adder, encoders, decoders, flip flops, and counters.
22ME1103	Design Tools Workshop	CO 1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modelling
		CO 2	Understand the concept of web page, web browser, web server, and able to create Static webpages
		CO 3	Understand the concept of report writing using a markup language Latex
		CO 4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR
22SC1209	IoT workshop	CO1	Practice the design ideology by 3D printing, 3D scanning techniques
		CO2	Visualize the design ideology by incorporating VR technique and VR technology, Visualize and present his design idea by applying AR technique and Hologram
		CO3	Practice of PCB technology
		CO4	Practice of Arduino based skill with different interfaces
22SC1202	Data Structures	CO1	Understand various sorting algorithms and analyze the efficiency of the algorithms
		CO2	Implement Linear Data Structures and Demonstrate their applications.
		CO3	Understand hashing techniques and Implement tree data structures.
		CO4	Understand graph data structures and apply graphs to solve problems
		COS	Develop and evaluate common practical applications for linear and nonlinear data structures.
22EC1202	Computer Organization & Architecture	CO1	Understand the functionality of CPU functional units - control unit, registers, the arithmetic and logic unit, instruction execution unit
		CO2	Understand the concepts of CPU and the operation of main, cache and virtual memory organizations
		CO3	Understand the concepts of the different types of I/O modules and I/O transfer techniques in computer modules
		CO4	Apply the concept of pipelining in instruction execution and design issues of RISC, CISC

  
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			and parallel computing architectures
22EC3107	Object Oriented Programming	CO1	Understand basic concepts of OOP, and apply the concepts of classes and objects through Java
		CO2	Apply access control, Inheritance, and Packages.
		CO3	Apply Interfaces, Exception Handling, multi-threading, I/o.
		CO4	Apply collection framework and event driven programming.
		CO5	Apply object-oriented programming concepts to write programs and Analyse requirements and design to implement lab-based projects with SDLC in a group of students.
22EC1203	Design of Basic Electronic Circuits	CO1	Understand the basic electronic components.
		CO2	Understand the basic circuit analysis techniques
		CO3	Understand the active circuit elements and working.
		CO4	Analyse the applications of semiconductor devices
22EC2106	Processors and Controllers	CO1	Understand the architecture and programming concepts of 8086 Microprocessor
		CO2	Understand the architecture and programming concepts of 8052 microcontroller
		CO3	Apply the Programming concepts of the 8051 and Interfacing of Peripherals.
		CO4	Understand the basic architectures of PIC and ARM 7 microcontrollers and design the systems.
22IN2202R	Embedded Systems Design	CO1	Understand the architecture and programming concepts of 8086 Microprocessor
		CO2	Apply the Programming concepts of 8051 Microcontroller
		CO3	Analyse the Interfacing of Peripherals to the 8051 microcontrollers 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

  
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22AD2102R	Database Management Systems	CO1	Illustrate the functional components of DBMS and Design an ER Model for a database.
		CO2	Design a relational model for a database & Implement SQL concepts and relational algebra.
		CO3	Implement PL/SQL programs, normalization techniques, and indexing to construct and access database
		CO4	Analyze the importance of transaction Processing, concurrency control and recovery techniques.
		CO5	Design a database and implement SQL queries and PL/SQL programs to do various operations on data.
		CO6	Design and query database using database programming skills
22IN2101R	IoT Principles & Architecture	CO1	Apply the concepts of IoT Architecture and technologies
		CO2	Apply the logical design of IoT system and communication technologies.
		CO3	Apply IoT networking protocols and Authentication Protocols for the IoT Application layer.
		CO4	Apply IoT protocols and programming concepts for real-world problems.
		CO5	Analyze the diverse application of diverse case studies
22AD2001R	DATA DRIVEN ARTIFICIAL INTELLIGENCE SYSTEMS	CO1	Understand and apply the concepts of intelligent agents and various search algorithms, to solve real-world problems.
		CO2	Analyse satisfaction problems, discover knowledge using logic and analyse reasoning techniques to make informed decisions in uncertain environments.
		CO3	apply and analyse various Machine Learning algorithms, Examine CNN and Deep Learning techniques
		CO4	Apply various Data Visualization Techniques, Analyse Data analytics techniques, Discover the insights from complex datasets.
		CO5	Examine AI for Data science lab in the python environment.
22IN2204R	Cloud Computing for IoT	CO1	To understand the cloud computing services , deployment models, enabling technology and architecture

  
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		CO2	understand and apply different cloud infrastructures virtualization and storage in different virtualization
		CO3	Analyze the concept of Data security and privacy in virtual machine
		CO4	Analyze the different case studies on healthcare, agriculture and parking system
		CO5	To analyze and integrate sensors reading values and uploading to Azure.
22EC2210R	Data Networks & Protocols	CO1	Apply the knowledge of communication to understand and analyse the physical and data link layer in networks
		CO2	Analyze different Network layer protocols and Routing algorithms
		CO3	Analyze different Transport layer, Session Layer, Presentation Layer and Application Layer Protocols
		CO4	Analyze different cryptography algorithms
		CO5	Analysis of different protocols with different topologies in networks
22EC2104R	ANALOG ELECTRONIC CIRCUIT DESIGN	CO1	Apply the knowledge of Semiconductor physics and discuss BJT configurations and its applications
		CO2	Apply the limitations of BJT and discuss the characteristics and applications of Field Effect Transistors
		CO3	Apply the linear and nonlinear circuits approaches and realize the characteristics of operational Amplifiers
		CO4	Apply the concept of feedback system and realise the working principles of Oscillators and multivibrators
		CO5	Design and analyze analogy circuits for real-time applications using Passive and Active Components
		CO6	Simulate and analyse Electronic Circuit using Multisim and myDAQ.
21IN2105	Deep Learning	CO1	Able to understand and remember the concepts of Perception, Back Propagation, PCA, Singular Value Decomposition
		CO2	Able to understand auto encoders- and apply Regularization, Denoising, Sparse, Contractive, Vectoral Representations of words Convolutional Neural Networks, LeNet, VGGNet, GoogleNet, ResNet, Fast RCNN,

  
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			Faster RCNN, YOLO
		CO3	Apply Long Short-Term Memory (LSTM) Restricted Boltzmann Machines, Deep Dream, GRU, Neural style transfer, Deep learning for computer vision, text and sequences.
		CO4	Build Markov models, Markov networks, Markov chains, Variational autoencoders, Autoregressive Models: NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), how to train DCGAN, limitations of deep learning
		CO5	Implement basic Neural Networks, optimization algorithms, engine vector decomposition, various types of auto encoders, batch normalization, convolutional neural networks
22IN2003R	REAL TIME OPERATING SYSTEMS	CO1	Understand subsystem components of the Kernel
		CO2	Understand memory and process virtualization and Paging, apply Page Replacement Algorithms
		CO3	Understand and Apply the threading issues for RTOS and Scheduling algorithms
		CO4	Understand and Apply the memory management concepts in RTOS
		CO5	Able to perform experimentation Real-Time Operating Systems Other Basic Operating System Functions
21IN2106	Big data Analytics	CO 1	Ability to find and transmit data emanated from different embedded and IoT devices
		CO 2	Ability to use HADOOP and MAP reduce tools in the process of undertaking Analytics
		CO 3	Ability to develop data Modelling, Structuring, and Analytics using "R" Language
		CO 4	Ability to conduct various kinds of analytics on big data especially using text
22IN2205	COMMUNICATION TECHNOLOGY	CO 1	Understand the concepts of signals and systems
		CO 2	Apply the concepts of Analog Modulation
		CO 3	Apply the concepts of Digital Modulation
		CO 4	Apply various line coding procedures and signalling schemes to facilitate data

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			communications
		CO5	Analyze analog and digital communication circuits
21IN3054	Industrial IoT	CO1	Apply the theory and practice related to Industrial IoT Systems
		CO2	Identify, formulate, and solve engineering problems by using Industrial IoT
		CO3	Design and analysis of Cyber-Physical System
		CO4	Implement real field problems by gaining knowledge of Industrial applications with IoT capability.
22SDIN01R	IOT HARWARE PROGRAMMING	CO1	ESP 32 Introduction – Pin Configuration – Features - Applications – Software and Driver Tools – Arduino IDE installation – ESP32 Boards manager package installation, GPIO, SERIAL COMMUNICATION– Posting data to cloud database.
		CO2	Raspberry Pi Introduction – Features - Applications – Software and Driver Tools – raspberry pi OS installation –GPIO, control LEDs, Switches, Sensors, and Actuators
		CO3	Raspberry pi Communication Protocol Connecting Raspberry Pi to cloud platforms, Uploading sensor data to the cloud, Implementing cloud-based dashboards and remote control of devices
		CO4	Designing an IoT project using Raspberry Pi, integrating sensors, actuators, and communication protocols, Testing, debugging, and deploying IoT applications,
22SDIN03R	FULLSTACK FOR IOT	CO1	Apply foundational Node-Red concepts to create structured and semantic front-end elements for IoT applications.
		CO2	Apply HTML and CSS styling techniques to design visually appealing and responsive user interfaces for IoT-based interfaces.
		CO3	Develop scripts and applications to collect and process data from IoT sensors and devices, providing real-time updates to the front-end.
22IOT3101R	Industrial Internet of Things	CO1	Able to understand Industry 4.0 and Industrial Internet of Things
		CO2	Able to touch up the various stages of the industrial revolution.

  
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		CO3	Understand how to solve data science problems using modern machine learning techniques.
		CO4	Construct solutions for industry (transport, health, agriculture, etc.)
		CO5	Build complete systems that include hardware and software and be exposed to modern and exciting hardware prototyping platforms
22IOT3202	Edge Computing	CO1	Describe the Edge/Fog Computing and infer the opportunities and application
		CO2	Examine the Architecture of Edge Computing and explore the issues that are being addressed by the industry
		CO3	Interpret the Security Requirements for Edge Computing and its Middleware needed
		CO4	Analyze the applicability and need for Edge/Fog Computing in various real-time projects
		CO5	Implementation of sensor based IOT applications
22IOT3305R	DEEP LEARNING	CO1	Classify Perception, Back Propagation, and dimensionality reduction algorithms to solve neural networks
		CO2	Apply Regularization techniques -dropout, normalizations, and generate CNN LeNet, AlexNet, ZF-Net, VGGNet models
		CO3	Illustrate RNN, Long Short Term Memory (LSTM), Deep art and autoencoders
		CO4	Construct Markov models, Markov networks, Markov chains and Autoregressive Models like NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), and DCGAN,
		CO5	Implement basic Neural Networks, optimization algorithms, various types of auto encoders, batch normalization, convolutional neural networks, RNN and LSTM
22IOT3508	BIG DATA ANALYTICS	CO1	To understand the basic concepts of BigData
		CO2	Understand architecture and ecosystem of Hadoop
		CO3	Associate Processing and Storage Layer of Hadoop, internal concept of Map Reduce for store of Big Data and other operations
		CO4	Associate YARN and Map Reduce for storing Big Data and examine Execution of job in Hadoop cluster
		CO5	Evaluate cluster management using YARN

  
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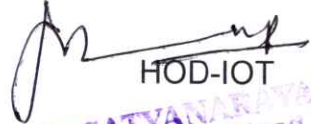
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22IOT3406 M	DATA VISUALISATION TECHNIQUES	CO1	Apply the Data Visualization tools to data using Excel and the associated concepts.
		CO2	Apply the Data Visualization tools to data using R and the associated concepts
		CO3	Analyze by applying the Data Visualization tools using Tableau and the associated concepts.
		CO4	Analyze by applying the Data Visualization for various management situations.

Academic Professor I/C

  
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