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

Accredited by **NAAC** as '**A++**' ❖Approved by AICTE ❖ ISO 21001:2018 Certified

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 Electronics and Communication Engineering
Program: M.Tech.- Internet of Things
Academic Year: 2021-23

COURSE CODE	COURSE NAME	CO NO	COURSE OUTCOME
21EC51B2	Internet of Things Architecture and Protocols	1	Understand the concepts of IoT Architecture, Reference model, and IoT enabling technologies.
		2	Understand the logical design of IoT systems and communication technologies.
		3	Understand IoT networking protocols and Authentication Protocols for the IoT Application layer.
		4	Apply IoT protocols and programming concepts for real-world problems.
21IN5101	Embedded Controllers & SOCs	1	Understand the concept of embedded system, microcontroller, different components of a microcontroller, and their interactions.
		2	Get familiarized with the programming environment to develop embedded solutions.
		3	Program ARM microcontroller to perform various tasks.
		4	Understand the key concepts of embedded systems such as I/O, timers, interrupts, and interaction with peripheral devices.
21EC5101	Wireless Communication and Data Networks	1	To understand the importance of Spreading Sequences and Multiuser systems
		2	To understand the importance of Multicarrier in present Communication Systems
		3	To understand the concepts of MIMO Systems, Spatial Multiplexing, and the importance of Ultra-Wideband Communications
		4	To understand the basic concept of mobile ad hoc networks and Wireless LAN Wi-Fi and IEEE 802.11 Standard Bluetooth and IEEE 802.15 Standards
21EC5104	Artificial Intelligence and Machine Learning	1	Understanding of basic search algorithms
		2	Study and applications of ANN and deep learning
		3	Application of various ML techniques of kMeans, kNN, SVM and GMM
		4	Understand various advanced computing methods

COURSE CODE	COURSE NAME	CO NO	COURSE OUTCOME
21IN51A1	IIoT 4.0 for Automation in Industries	1	Knowledge of theory and practice related to Industrial IoT Systems
		2	Ability to identify, formulate and solve engineering problems by using Industrial IoT
		3	Knowledge of the design and analysis of Cyber-Physical System
		4	Ability to implement real field problems by gaining knowledge of Industrial applications with IoT capability.
21IN51A2	Energy Harvesting Technologies for IoT	1	Understand the concepts of renewable energy systems and energy harvesting for WSN.
		2	Understand the solar energy harvesting technologies and designing solar power systems for IoT. protocols for standards
		3	Apply mechanical energy harvesting technology for WSN and design a system for real-world problems
		4	Apply Electromagnetic energy harvesting technologies for small-power applications and current research on hybrid systems.
21IN51A3	Advanced Embedded System Design	1	Understand the ARM Cortex-M4 architecture of embedded systems
		2	Understand the onboard protocols used in the Embedded system and testing and debugging.
		3	Design concepts needed to build an embedded system using RTOS
		4	Analyze the insights of RTOS internal design and implementation
21IN51A4	Data Management and Security	1	Understanding of database systems and architecture, data models, and declarative query languages
		2	Understand and characterize modern techniques of database information security threats and techniques for database security assessment
		3	analyse information in a database to identify information security incidents
		4	Tools for database management systems monitoring
21RA51B2	Human Machine Interface & Brain-Machine Interface	1	Understanding the basics of HMI: Asimov's Laws, GUI Design, Aesthetics, Developments in Bio-Chips, Heuristics.
		2	Understanding the HMI Technologies such as GMOs Models, CMN-GOMS, Fitts Laws, Hick-Hyman Laws, Norman's 7 Principles.
		3	Understanding the concept of Brainwaves & BMI
		4	Analyzing Humanoids & HMI/BMI Applications: Hierarchical Task] Analysis, Dialog Design, Use of FEM

COURSE CODE	COURSE NAME	CO NO	COURSE OUTCOME
21EC51B2	Data Bases, Data Modeling & Data Structure	1	Understanding of database systems and architecture, and data models.
		2	Understand and characterize modern techniques of database information.
		3	Understand the concept of database to identify information and ER Modelling.
		4	Apply the concurrency control, recovery, security, and indexing for the real-time data
21IN51B3	Computer Vision & Applications	1	Implement fundamental image processing techniques required for computer vision.
		2	Apply Hough Transform for line, circle, and ellipse detections
		3	Apply 3D vision techniques. Implement motion-related techniques; develop applications using computer vision techniques.
		4	Understands motion analysis. To study some applications of computer vision algorithms.
21EC51Q2	System on Chip Design	1	Acquire knowledge about Top-down SoC design flow
		2	Understand the system-level design of communication networks.
		3	Apply system-level design and analyze MPSoC concepts
		4	Acquire knowledge about NoC
21IE3149	SEMINAR	1	Enhancing verbal delivery, body language, PowerPoint skills, structuring of the presentation, engaging audience, tone of presentation for the overall improvement of individual presentation skills.
21TS51I1	TECHNICAL SKILLING - I	1	Enhancing the system design and modeling capabilities through visualization of scientific theories and concepts while building and developing the capabilities of designing a new system by altering and implementing new algorithms and methods through visualization tools.
21IN5202	Wireless Sensor Network and Security	1	Understand the fundamentals of wireless sensor networks and the various protocols at various layers.
		2	Understand MAC Protocols and sensor networks application.
		3	Understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.
		4	Identify security threats in wireless networks and design strategies to manage network security
21IN5203	IoT Cloud computing	1	Understand the concepts of IoT system architecture, important IoT features, and platforms
		2	Distinguish the cloud computing architecture, web services, and related services
		3	Apply the cloud computing platforms such as Microsoft Azure and Google Cloud Platform (GCP)

COURSE CODE	COURSE NAME	CO NO	COURSE OUTCOME
		4	Analyze the security in cloud computing, the significance of Fog computing and green cloud
21IN5204	Big data Analytics for IoT	1	Big Data Science and Machine Intelligence
		2	Machine Learning for Big Data in Healthcare Applications
		3	Apache Hadoop and Apache Spark
		4	Data Analytics using Azure
21IN5205	IoT System Design Techniques	1	Understand various building blocks and working of state-of-the-art IoT systems and IoT system design enabling technologies.
		2	Understand the Real-world design constraints and design and develop the system with Hardware and software tools.
		3	Understand the Product Design and Development process and gain enough insights to conceive and build IoT systems on their own
		4	Apply the design concepts for Industrial IoT and Health Care applications.
21IN51C1	Edge Computing and Mobile Applications	1	Understand various Edge computing scenarios and case studies.
		2	Understand the Edge computing Architectures and protocols.
		3	Develops mobile computing and standardized hardware and software platforms.
		4	Apply the Edge concepts for Mobile application development.
21IN51C2	5G NR - Next Generation Wireless Technologies	1	Understand the 5G New Radio and Road map to 5G, Pillars of 5G New Multicarrier Modulation schemes.
		2	Apply the massive MIMO technologies for 5G and investigate the schemes of pre-coding, channels, and communications on machine and device to device
		3	Applying the 5G technology to Millimeter-wave communication and transceiver architecture
		4	Applying the concepts of 5G on vehicular communication, architectures of intelligent vehicles.
21RA51C1	Adaptive motion control systems for automation and robotics	1	Understand the Principles and design concepts of various adaptive control Mechanisms.
		2	Understand the Principles and design concepts of Autonomous Tracked Robots
		3	Understand the Principles and design concepts of Motion Vision and Motion estimation
		4	Understand the Principles and design of Optimization for Motion Control Systems

COURSE CODE	COURSE NAME	CO NO	COURSE OUTCOME
21RA51D1	Optimization algorithms for autonomous systems	1	Understand Machine Learning based Optimization models for various problem-specific solutions.
		2	Apply evolutionary programming and strategies in engineering aspects.
		3	Design Mathematical Models of Genetic Algorithms fitness functions.
		4	Apply and analysis of advanced autonomous optimization techniques.
21EC51D4	Block Chain & Cyber Security	1	Understand emerging abstract models for Blockchain Technology
		2	Analyze the concept of bitcoin and the mathematical background behind it
		3	Apply the tools for understanding the background of cryptocurrencies
		4	Identify major research challenges and technical gaps existing between theory and practice in the cryptocurrency domain
21RA51D2	Automotive Electronics & Avionics	1	Acquire the fundamental knowledge of automotive electronics.
		2	Explore and conjugate the emerging technologies utilized to assist Autonomous Vehicles.
		3	Analyze Electronics Embedded to Automotive Electronics and autonomous Vehicles
		4	Acquire the basic knowledge of aviation technology.
21EC51D1	FPGA-Based Wireless System Design	1	Understand basic concepts of software-defined radio
		2	Analysis of FPGA Speed, Area & Power
		3	Acquire knowledge of advanced encryption standards
		4	Understand the FPGA for wireless system application
21IN51D4	Cyber Physical Systems	1	Understand the basics of cyber physical systems.
		2	Enumerates several fields where cyber-physical systems are widely used.
		3	Design and develop robotics algorithms and cyber physical systems
		4	Apply modern tools to develop CPS applications
21IE5250	TERM PAPER	1	Enhancing the skill sets in research by recognizing and identifying problems, exploring/defining the problem by gathering information, formulation of the research objectives, and addressing the problem through scientific process and methods.
21TS52I2	TECHNICAL SKILLING-II	1	Enhancing the system design and modeling capabilities through visualization of scientific theories and concepts while building and developing the capabilities of designing a new system by altering and implementing new algorithms and methods through visualization tools.

Academic Professor I/C   **HOD-ECE**