# KAKATIYA UNIVERSITY, WARANGAL FACULTY OF ENGINEERING AND TECHNOLOGY DEPT OF ECE AND CSE

# CERTIFICATE COURSE: INTERNET OF THINGS PAPER=I

#### Objectives:

- 1. To understand Smart Objects and IoT Architectures and learn about various IOT-related protocols
- 2. To build simple IoT Systems using Arduino and Raspberry Pi
- 3. To understand data analytics, cloud in the context of IoT and to develop IoT infrastructure for popular applications

Outcomes: At the end of this course, students will be able to:

- 1. Understand the concepts of Internet of Things
- 2. Analyze basic protocols in wireless sensor network
- 3. Design IoT applications in different domain
- 4. Able to analyze design performance
- 5. Implement basic IoT applications on embedded platform

## UNIT - I (10 HRS)

Fundamentals of IoT: Evolution of Internet of Things - Enabling Technologies - IoT Architectures: one M2M, IoT World Forum (IoTWF) and Alternative IoT models -Simplified IoT Architecture and Core IoT Functional Stack -- Fog, Edge and Cloud in IoT - Functional blocks of an IoT ecosystem - Sensors, Actuators, Smart Objects and Connecting Smart Objects.

### UNIT - II (10 HRS)

IoT Protocols IoT access technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN - Network Layer: IP versions, Constrained Nodes and Constrained Networks -Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy

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Networks - Application Transport Methods: Supervisory Control and Data Acquisition - Application Layer Protocols: CoAP and MQTT.

# UNIT - III (8 HRS)

Design and development design methodology: Embedded computing logic -Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming -Raspberry Pi - Interfaces and Raspberry Pi with Python

## References:

- 1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017
- 2. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On

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## KAKATIYA UNIVERSITY, WARANGAL FACULTY OF ENGINEERING AND TECHNOLOGY DEPT OF ECE AND CSE

## CERTIFICATE COURSE: INTERNET OF THINGS PAPER-II

#### Objectives:

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## UNIT - I (10 HRS)

Data analytics and supporting services: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest - Role of Machine Learning - No SQL Databases - Hadoop Ecosystem - Apache Kafka, Apache Spark - Edge Streaming Analytics and Network Analytics - Xively Cloud for IoT, Python Web Application Framework - Django -AWS for IoT - System Management with NETCONF-YANG Developing.

## UNIT - II (10 HRS)

Case studies/industrial applications: Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry - GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

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### References:

- David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017
- 2. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"

