Course Code: ELE-523
Course Title: Internet of Things
Number of Credits: 04   **Total Hours: 60**   **Total Marks: 100**
Effective from AY: 2022-23

Prerequisites for the course
Students should know the basic knowledge about passive electrical and electronics components, and programming

Objectives of Course
This course is intended to: • Introduce the fundamentals of Internet of Things and its building blocks along with their characteristics.   • understand the protocols and standards designed for IoT and the current research on it.   • know the other associated technologies like cloud and fog computing in the domain of IoT.   • provide the recent application domains of IoT in everyday life.

Course Content

Unit I	Introduction	05 Hours
Evolution, Addressing strategies, Sensing and Actuation -Type, Characteristics, Processing topologies and types		

Unit II	IOT Networking	10 Hours
Basics of Networking, Networking Components, Connectivity Protocol: 6LoWPAN and RFID, Data Protocol – MQTT, SMQTT, CoAP, XMPP and AMQP, Communication protocols – IEEE 802.15.4, Zigbee, HART & Wireless HART, NFC, Bluetooth, Z-wave and ISA 100.11A		

Unit III	Sensing Network	15 Hours
Wireless Sensor Networks, Sensor nodes, Sensor web, Node Behavior in WSNs, Applications of WSNs, Coverage of WSNs, Stationary and Mobile Wireless Sensor Network, UAV Network, Flying Ad Hoc Network, Interoperability		

Unit IV	Software Defined Networking	10 Hours
Basic concept, SDN architecture, SDN in IOT, Software Defined WSN, SDN for Mobile Networking		

Unit V	Cloud and Fog Computing	10 Hours
Cloud Computing: Fundamentals, Components & Characteristics, Architecture, Service Models, Cloud types, Service Management & Security and Sensor Cloud, Fog Computing: Fog nodes, Architecture, Fog Computing in IOT and Application		

Unit VI	IOT case studies and Future Trends	05 Hours
Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IOT, Agriculture, Healthcare, Paradigms, Challenges and the future.		
Unit VII	Hands-on	05 Hours
Integration of sensors and actuators with Ardunio, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IOT with Raspberry Pi		

Pedagogy

Lectures/Experiential Learning

Course Outcome

On completion of the course, students will be able to:

1. Explain the of IOT enabling components, such as sensors, connectivity protocols, and communication protocols.
2. Describe the IOT architecture and its component details.
3. Explain the associated technologies including cloud computing, fog computing and its applications.
4. Gain practical knowledge about the integration of sensor and actuators, coding structure, and implementation of IOT in various applications.

References/Readings

1. S. Misra, A. Mukherjee, and A. Roy, 'Introduction to IoT', Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 'Introduction to Industrial Internet of Things and Industry 4.0', CRC Press.
3. Pethuru Raj and Anupama C. Raman, 'The Internet of Things: Enabling Technologies', Platforms, and Use Cases", CRC Press.
4. Arshdeep Bahga and Vijay Madisetti, 'Internet of Things: A Hands-on Approach', Universities Press.