

## CSPE3018 INTERNET OF THINGS (3-0-0)

### Course Objectives:

- To study the fundamentals of IoT.
- To study various protocols used in the Internet of Things environment.
- To study the design methodology and different IoT hardware and software required for designing an IoT system.
- To study various IoT case studies and industrial applications.

### Module - I: (08 Hrs)

Introduction to Internet of Things: Introduction – Definition - phases - Foundations - Policy-Challenges and Issues - identification - security –privacy.

Components in IoT: Control Units- Sensors -Communication modules - Power Sources -Communication Technologies - RFID - Bluetooth –Zigbee – Wifi – RF links - Mobile Internet - Wired Communication.

### Module - II: (10 Hrs)

Programming the Microcontroller for IoT: Basics of Sensors and actuators - examples and working principles of sensors and actuators - Arduino/Equivalent Microcontroller platform- Setting up the board - Programming for IOT- Reading from Sensors.

Sensing and Actuation: Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT.

### Module - III: (10 Hrs)

Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB - connection with the internet using wifi / Ethernet. Fundamental Concepts of Agility and Autonomy -Enabling Autonomy and Agility by the IoT - The Evolution from the RFID- based EPC Network to an Agent-based Internet of Things - Agents for the Behavior of Objects.

### Module - IV: (12 Hrs)

Business Models for the Internet of Things: The Meaning of DiY in the Network Society - Sensor actuator technologies and Middleware as a basis for a DiY Service Creation Framework – Device, Integration: Middleware Technologies Needed for a DiY Internet of Things. IoT Application Development: Framework for IoT Applications of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices

### Module - V: (06 Hrs)

IoT Case Studies: IoT Case studies based on industrial Automation, Transportation, Smart cities, smart supply chain, Remote site monitoring.

### Course Outcomes:

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

1. Understand the basic architecture of Internet of Things-based Devices
2. Illustrate wireless communication systems.
3. Identify actuators and sensor technologies for sensing real-world entities.
4. Apply design methodology and cloud platforms involved in IoT.
5. Deploy an IoT application and connect to the cloud.
6. Compare IoT Applications in the Industrial & real world.

### Textbooks:

1. Adrian Mcewen, Hakin Cassimally, “Designing The Internet of Things”, First Edition, Wiley, 2014.
2. Keysight Technologies, “The Internet of Things: Enabling Technologies and Solutions for Design and Test”, Application Note, 2016.
3. Vijay Madiseti, Arshdeep Bahga, “ Internet of Things A Hands-On- Approach”,2014, ISBN:978 0996025515.

**Reference Books:**

1. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill. 2nd edition June 2022.
2. Pethuru Raj, Anupama C. Raman, "The Internet of Things Enabling Technologies, Platforms, and Use Cases", Taylor and Francis group. February 2017.
3. Peter Waher, "Mastering Internet of Things: Design and create your own IoT applications using Raspberry Pi 3", First Edition, Packt Publishing, 2018.