

**Course Learning Objectives:**

- Understand the concepts of Internet of Things.
- Analyze basic protocols in wireless sensor network.
- Design IoT applications in different domain and be able to analyze their performance.
- Implement basic IoT applications on embedded platform.

**Course Outcomes: After completing the course, the students will be able to,**

- Understand IoT applications and Architectures in real world and realize the various IoT Protocols
- Differentiate between the levels of the IoT stack and be familiar with the key technologies
- Interface different sensors to arduinouno and raspberry pi to read the environment data.
- Appreciate the role of big data, cloud computing and data analytics in a typical IoT system
- To provide an overview on the ICT ecosystem and enabling environment
- To provide an understanding of the technologies and the standards relating to the IoT
- To develop skills on IoT technical planning and Identify how IoT differs from traditional data.

**UNIT-I****12Hrs.**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs **IoT enabled Technologies** – Wireless Sensor Networks, Cloud Computing, **Big data analytics**, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, **health and Lifestyle, IoT challenges.**

**UNIT-II****12Hrs.**

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT **System Management with NETCOZF, YANG-NETCONF, YANG, SNMP NETOPEER**

**UNIT-III****12Hrs.**

IoT Physical Devices and Endpoints -- Introduction to Arduino, Arduino UNO, **Fundamentals of Arduino Programming**; Interfacing Sensors and actuators with Arduino Uno. Introduction to Nodemcu, programming with Nodemcu, Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – **Python program with Raspberry PI with focus** of interfacing external gadgets, controlling output, reading input from pins.

**UNIT-IV****12Hrs.**

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication **APIs Webserver** – Web server for **IoT**, Cloud for IoT, **Python web application** framework, Designing a **RESTful web API.**

**REFERENCE BOOKS:**

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things - A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547
2. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014, ISBN: 9789350249759.