Course Code	Course Title	Credits	Lectures /Week
USCS404	**IoT Technologies**	**2**	**3**

About the Course:

The course aims to provide basic understanding of SoC architectures; IoT, different types of IoT platforms and different types of applications that can be built.

Course Objectives:

- Introduce concepts of SoC and IoT
- Introduce various types of IoT platforms
- Interfacing various types of devices using different protocols with IoT
- Understand practical applications of IoT in real life world

Learning Outcomes:

After successful completion of this course, students would be able to

- understand SoC and IoT
- use different types of IoT Platforms and interfaces
- understand and implement an idea of various types of applications built using IoT

Unit	Topics	No of Lectures
I	**Fundamentals of IoT:** Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M. **System on Chip:** What is System on chip? Structure of System on Chip. SoC Elements: FPGA, GPU, APU, Compute Units. **Different types of IoT/SoC Platforms:** Introduction to Raspberry Pi, Arduino & NodeMCU, Introduction to SoC-ARM Architecture, atmega328 architecture	**15**
II	**Interfacing with IoT Platforms:** Basic hardware components like LED, Button, Camera, 8X8 LED Grid, Motor etc and interfacing them for input/output with IoT devices using PWM, UART, GPIO, I2C, SPI **Using Sensor & Actuators**: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensor, Level Sensors, Ultrasonic sensors, Interfacing of Actuators, Interfacing of Relay Switch and Servo Motor **IoT and Protocols IoT Security:** HTTP, UPnP, CoAP, MQTT, XMPP, Privacy and Security Issues in IoT.	**15**

III	**IoT & Web:** Web server for IoT, Sending/Receiving data between web server & IoT device, Cloud for IoT, Node RED, M2M vs IoT Communication Protocols, Basics of WSNs, WSN architecture and types, **IoT Applications:** Modern IoT case studies / applications used in the areas of transportation, agriculture, health care etc **Edge Computing:** Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures, Edge platforms, Edge vs Fog Computing, Communication Models - Edge, Fog and M2M.	**15**

Textbooks:

1. Introduction to IoT Paperback by Sudip Misra , Anandarup Mukherjee , Arijit Roy , Cambridge Press, 2022
2. Jain, Prof. Satish, Singh, Shashi, "Internet of Things and its Applications", 1st Edition, BPB, 2020.
3. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Internet of Things, Wiley, India, 2019
4. IoT and Edge Computing for Architects - Second Edition, by Perry Lea, Publisher: Packt Publishing, 2020

Additional References:

1. Internet of Things by Vinayak Shinde, SYBGEN Learning India Pvt. Ltd, 2020
2. Internet of things, Dr. Kamlesh Lakhwani, Dr. Hemant kumar Gianey, Josef Kofi Wireko, Kamalkant Hiran, BPB Publication, 2020
3. Arduino, Raspberry Pi, NodeMCU Simple projects in easy way by Anbazhagan k and Ambika Parameswari k, 2019.
4. IoT based Projects: Realization with Raspberry Pi, NodeMCU Paperback – February 2020, by Rajesh Singh Anita Gehlot, 2020
5. Mastering the Raspberry Pi, Warren Gay, Apress, 2014