

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV B.E. Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR7E3 Internet of Things	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn the concepts of Sensors, Wireless Network and Internet
- To learn and implement use of Devices in IoT technology.
- To learn the different IoT Technologies like Micro-controller, Wireless communication like Blue Tooth, GPRS, Wi-Fi and Storage and embedded systems
- To understand how to program on embedded and mobile platforms including different Microcontrollers like ESP8266, Raspberry Pi, Arduino and Android programming
- To understand how to make sensor data available on the Internet (data acquisition) and understand how to analyse and visualize sensor data

Pre requisites: Basic knowledge of a programming language.

COURSE OF CONTENTS

UNIT I.

(Introduction to IoT, Sensors and Actuators) Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi-Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, and Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators.

UNIT II.

(Introduction to Networking, Communication Protocols and Machine-to-Machine Communication) Basics of Networking, Communication Protocols, Sensor Network, Machine to Machine Communication (IoT Components, Inter-Dependencies, SoA, Gateways, Comparison Between IoT& Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, Protocol Classification, MQTT & SMQTT, IEEE 802.15.4, Zigbee)

UNIT III.

(Arduino Programming) Interoperability in IoT, Introduction To Arduino Programming, Integration Of Sensors And Actuators With Arduino

UNIT IV.

(Python Programming and Raspberry Pi) Introduction to Python Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi

UNIT V.

(Data Analytics and Cloud Computing) Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow

UNIT VI.

(FOG Computing and Case Studies) FOG Computing: Introduction, Architecture, Need, Applications and Challenges

UNIT VII.

Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring

Learning Outcomes:

Upon completing the course, students will be:

- Familiar with Arduino environment and its applications.
- Able to understand Arduino programming with C++.
- Able to Design Smart systems applications.
- Learn and understand about any new IDE, compiler, and MCU chip in Arduino compatible boards or similar types.

REFERENCE BOOKS

- "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).
- "Internet of Things: A Hands-on Approach", by A Bahga and Vijay Madisetti (Universities Press)

List of Experiments:

- Experiments on digital input and digital output on Arduino Mega board and using LED and Buzzer.
- Experiments on analog input and analog output on Arduino Mega board using PWM. Experiment on LCD display:-Print numbers, Name, Time etc.
- Serial Communication between Arduino board and PC:-character send and received, Read and display voltage
- Experiments on DC Motor to control motor speed and direction of rotation.
- Experiments on servo Motor to rotate servo motor.
- Experiments on Stepper Motor to rotate bidirectional.
- Experiments on TV Remote with LCD.