DSE – 04 (b): Internet of Things (IoT)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Internet of Things(IoT)	4	2	0	2	Class XII pass	DSC-01

Learning Objectives
1. *To make students understand what IoT is and how it works today*
2. *To make students aware of different applications of IoT.*
3. *To introduce students to technologies and smart systems under IoT*

Learning Outcomes:
1. *Able to understand the application areas of IOT ·*
2. *Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks*
3. *Able to understand building blocks of Internet of Things and characteristics.*

UNIT-I (5 Hours)
Introduction to IoT: Definition and Characteristics, Physical Design Things- Protocols, Logical Design- Functional Blocks, Communication Models- Communication APIs- Introduction to measure the physical quantities.

UNIT-II (5 Hours)
IoT Enabling Technologies - Wireless Sensor Networks, Cloud Computing Big Data Analytics, Communication Protocols- Embedded System- IoT Levels and Deployment Templates.

UNIT-III (10 Hours)
Introduction to Smart Systems using IoT: IoT Design Methodology- IoT Boards (Raspberry Pi, Arduino) and IDE - Case Study: Weather Monitoring- Logical Design using Python, Data types & Data Structures- Control Flow, Functions- Modules- Packages, File Handling - Date/Time Operations, Classes- Python Packages of Interest for IoT.

UNIT-IV (5 Hours)
Sensing and Sensors: Wireless Sensor Networks, Challenges and Constraints, Introduction – Fundamentals of MAC Protocols – MAC protocols for WSN – Sensor MAC Case Study.

UNIT-V (5 Hours)
Applications: Home Automation, Smart Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle, IoT and M2M

References:
1. Michael Miller, The Internet of Things, Pearson Education, 2015.
2. Arshdeep Bahga and Vijay Madisetti, Internet of Things: Hands-on Approach, Hyderabad University Press, 2015.
3. Greengard, Samuel. The internet of things. MIT press, 2015.

List of Practicals: (60 Hours)
1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries.
12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.