

Unit I

Introductions to Embedded system, Application and purpose of Embedded system, Quality Attributes of Embedded system, Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.

Unit II

Architecture of 8051 Microcontroller, microcontroller hardware, Pin diagram of 8051, input/output pins, ports and circuits. Internal RAM and ROM, SFR's, interfacing with external memory, timers and counters, interrupts. Serial data communication (UART).

Unit III

Instruction Set of 8051 & Addressing modes: Classification of instruction set - Data transfer group, arithmetic group, logical group, single bit, branching group, CALL and RET instructions and their usage. Addressing modes - Immediate, register, direct, register indirect and indexed addressing modes. Accessing the data from internal and external memory. Programming and Interfacing of simple switch and LED to I/O ports to switch on/off LED with respect to switch status.

Unit IV

Introduction to Architecture of Arduino, ESP 8266 and Raspberry PI, Instruction set of Arduino, ESP 8266 and Raspberry PI, Programming and Interfacing of various sensors with Arduino, ESP 8266 and Raspberry PI. Case Study for Embedded and IoT Design: Home Automation. Agriculture Environment – Industry – Health and Life style.

Reference Books:

- 1). Internet of Things: A Hand on Approach by Arshdeep Bahga and Vijay K. Madiseti
- 2). The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/Cengage Learning.
- 3). Designing the Internet of Things by Adrian McEwen, Hakim Cassimally
- 4). Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud by Cuno Pfister

Practical(s)

- 1 To study Architecture of IoT systems.
- 2 To study 8051 Microcontroller Architecture.
- 3 To study an assembly language program for Data transfer for block data movement, sorting and exchanging.
- 4 To study an assembly language program to add, subtract, multiply, divide 16 bit data.
- 5 To study an assembly language program for Bit addressable Instructions.
- 6 To study Digital, Analog and Advanced I/O functions of Arduino IDE.
- 7 To study Time, Math and Character functions of Arduino IDE.
- 8 Write a sketch and Interface an LED with Arduino.
- 9 Write a sketch and Interface Light Crystal Display with Arduino
- 10 Write a sketch and Interface Temperature sensor with Arduino.
- 11 Write a sketch and Interface Light Depending Resistance sensor with Arduino.

- 12 Write a sketch and Interface Moisture sensor with Arduino.
- 13 Write a sketch and Interface Temperature sensor with ESP 8266.
- 14 Write a sketch to create Access Point, Server/web Server and Client with ESP 8266.
- 15 To Introduce and setting up a Raspberry Pi.
- 16 To Interface an LED with Raspberry Pi.