COURSE TITLE : IoT Architectures and Protocols

COURSE CODE: BCSE310L

Module 1: IoT Fundamentals (5 hours)

- **Definition and Characteristics** of the Internet of Things (IoT)
- **Challenges and Issues** in IoT
- **Physical Design** of IoT
- **Logical Design** of IoT
- **IoT Functional Blocks**

Module 2: IoT Communication Architectures and Protocols (7 hours)

- **Control Units & Communication Modules**
- **Wireless Communication Technologies:**
  - Bluetooth
  - Zigbee
  - WiFi
  - GPS
- **IoT Protocols:**
  - IPv6
  - 6LoWPAN
  - RPL
  - CoAP
  - MQTT
- **Wired Communication & Power Sources**

Module 3: Technologies Behind IoT (5 hours)

- **Four Pillars of IoT Paradigm:**
  - RFID (Radio Frequency Identification)
  - Wireless Sensor Networks (WSN)
  - Supervisory Control and Data Acquisition (SCADA)
  - Machine-to-Machine (M2M) Communication
- **IoT Enabling Technologies:**
  - Big Data Analytics
  - Cloud Computing
  - Embedded Systems

Module 4: Programming the Microcontroller for IoT (5 hours)

- **Working Principles of Sensors**
- **IoT Deployment on:**
  - Raspberry Pi
  - Arduino
  - Equivalent Platforms
- **Sensor Data Processing and Communication:**
  - Reading from Sensors
  - Connecting Microcontroller with Mobile Devices
  - Communication through Bluetooth, WiFi, and USB
- **Operating Systems & Simulation:**
  - Contiki OS
  - Cooja Simulator

Module 5: Resource Management in IoT (5 hours)

- **Scalability in IoT:**
  - Network Configuration Protocol
  - Open vSwitch Database Management Protocol (OVSDB)
- **Routing and Protocols:**
  - Collection Tree Protocol
  - LOADng (Lightweight On-demand Ad hoc Distance-vector Routing Protocol - Next Generation)

Module 6: IoT to Web of Things (WoT) (9 hours)

- **Scope of Web of Things (WoT)**
- **IoT Data Management:**
  - Setting up Cloud Environment
  - Cloud Access from Sensors
  - Data Analytics Platforms for IoT
- **Resource Identification:**
  - Richardson Maturity Model
  - REST API

Module 7: Applications of IoT (7 hours)

- **Business Models for IoT**
- **Smart Technologies & Use Cases:**
  - Green Energy Buildings & Infrastructure
  - Smart Farming
  - Smart Retailing
  - Smart Fleet Management