Y/D/TY

Reg. No: 22BCE0325

VIT
Vellore Institute of Technology

Final Assessment Test – April 2025

Course: BCSE310L - IoT Architectures and Protocols

Class NBR(s): 1540/1545/1548/1549/1550

Slot: C1+TC1

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Discuss in detail about how IoT functional blocks interact in a smart home automation system with a neat architecture diagram and explain their significance in real-time monitoring and control.

2. A manufacturing plant aims to implement an IoT-based industrial automation system to monitor machine performance, temperature, and energy consumption in real time. Additionally, a smart metering system is required to track electricity usage efficiently. Design a ZigBee based architecture and explain how it can be integrated into this IoT solution. Compare its advantages over other wireless communication protocols.

3. A healthcare monitoring system needs to transmit patients' vital signs (such as heart rate and oxygen levels) from wearable devices to a cloud server for remote monitoring. Design an MQTT-based architecture for this system and discuss how MQTT protocol design ensures efficient data transmission while maintaining security and reliability.

4. Design a SCADA-based water distribution system for state and municipal water utilities to monitor and regulate water flow, reservoir levels, pipe pressure, and other factors. Explain the various components of the system design with a neat architecture diagram.

5. Automatic street light system helps in nighttime safety for pedestrians and road users. The street light Automation system can reduce energy consumption and maintenance costs and helps to reduce crime activities up to certain limit. Discuss in detail about the different types of sensors used for designing the Automatic Street light system applications with a neat architecture diagram.

6. Write a Arduino program to control an LED and a buzzer simultaneously where an LED blinks and a buzzer beeps whenever motion is detected using a PIR sensor.

7. List various parameters to be considered for grouping IoT nodes into clusters and discuss in detail about Pros and Cons of various clustering protocols.

8. Discuss in detail about the architecture of Open vSwitch Database Management protocol and describe the role of the OVS Database (OVSDB) in managing virtual network configurations.

9.a) Design an Internet of Things (IoT) environmental monitoring system through the integration of sensors, Arduino, and cloud connectivity. The system should collect and transmit realtime data on temperature, humidity, and light intensity in the surrounding environment to a cloud platform for analysis and visualization.

OR

9.b) A retail store uses IoT-enabled smart shelves that track inventory in real time and sync data with a cloud-based management system. Discuss how this IoT-cloud integration helps in inventory optimization, demand forecasting, and automated restocking.

10.a) Design an IoT-based smart irrigation system for agriculture that incorporates key functional blocks such as identification, sensing, actuation, communication, and management. Describe in detail about how these components work together to enable automated watering, soil moisture monitoring, and remote farm management and also list out the benefits of the system.

OR

10.b) A logistics company wants to track its fleet using GPS and Onboard Diagnostics (OBD) while ensuring real-time data availability. Discuss in detail about how local data processing can enhance fleet tracking accuracy and vehicle health monitoring.

⇔⇔⇔ Y/D/TY ⇔⇔⇔