IO4041 Introduction to Internet of Things – BSE Spring 2025 – Quiz 4

A

Roll # _____ Name _____ Section _____

1. Why are decentralized solutions often preferred over centralized management in large-scale WSNs?

   A. They always provide optimal routes.
   B. Centralized management is difficult due to scale and energy constraints.
   C. Decentralized solutions require less complex algorithms.
   D. Base stations in decentralized systems have more processing power.

2. Detecting leaks in gas pipelines using WSNs often relies on identifying a _____, whereas fluid pipelines might show a _____.

   A. hot-spot, cold-spot
   B. cold-spot, hot-spot
   C. magnetic anomaly, thermal anomaly
   D. pressure drop, temperature rise

3. Which factors facilitate attacks on WSNs? (Multiple Answers)

   A. Strong, built-in encryption in all nodes.
   B. Unattended operation.
   C. Wireless communication channels.
   D. Limited resources hindering advanced security features.

4. Which of the following is a significant challenge in WSNs?

   A. High processing power
   B. Limited energy resources
   C. High data transfer rates
   D. Consistent wireless connection

5. Which RPL control message is used by a node to actively request information about nearby DODAGs if it hasn't heard any DIO messages?

   A. DAO (Destination Advertisement Object)
   B. DIO (DODAG Information Object)
   C. DAO-ACK (DAO Acknowledgment)
   D. DIS (DODAG Information Solicitation)

6. How does point-to-point (P2P) communication typically occur in RPL's "storing" mode?

    A. Packets always travel up to the root and then down to the destination.

    B. Packets travel directly if the nodes are neighbors, otherwise fail.

    C. Packets travel upward to a common ancestor and then downward to the destination.

    D. P2P is not supported in storing mode.

7. The ETX (Expected Transmission Count) metric primarily characterizes:

    A. The energy consumed per transmission.

    B. The latency of a link.

    C. The quality/reliability of a link.

    D. The maximum throughput of a link.

8. When using an Arduino Uno as a serial bridge to program an ESP-01 module, how are the TX/RX pins connected between the Arduino and ESP-01?

    A. Arduino TX to ESP TX; Arduino RX to ESP RX

    B. Arduino TX to ESP RX; Arduino RX to ESP TX

    C. Only Arduino TX to ESP RX is needed.

    D. Connection is made via the USB port directly, bypassing Arduino pins.

9. Which function call in the provided ESP8266 Arduino code initiates an HTTP request?

    A. http.begin(client, serverPath.c_str())

    B. http.GET()

    C. http.getString()

    D. WiFi.begin(ssid, password)

10. Which of the following is true about the ESP32 chip?

    A. It always has a single core CPU

    B. It supports Bluetooth 4.2

    C. It has 80 KB of RAM

    D. It is incapable of Wi-Fi communication

Roll # _____ Name _____ Section _____

1. Which of the following are significant challenges in WSN security? (Multiple Answers)

    A. Remote and unattended operation.
    B. High computational power of sensor nodes enabling complex encryption.
    C. Wireless communication medium.
    D. Infeasibility of conventional security techniques due to resource constraints.

2. Precision agriculture technologies like variable rate fertilizer application rely on WSNs to address:

    A. Homogeneity of large farms.
    B. Wide spatial diversity within a field.
    C. Pest control using acoustic sensors.
    D. Predicting weather patterns.

3. The ability of a WSN to discover, identify, and react to network disruptions is called _____.

    A. Self-organization
    B. Self-optimization
    C. Self-protection
    D. Self-healing

4. What is the typical communication scheme used in WSNs?

    A. Peer-to-peer
    B. Point-to-multipoint
    C. Many-to-one
    D. None of the above

5. What is the primary purpose of a DAO message in RPL?

    A. To broadcast the node's rank.
    B. To request to join a parent and establish downward routes.
    C. To solicit DODAG information from neighbors.
    D. To acknowledge receipt of a data packet.

6. Which of the following are characteristics of Low Power and Lossy Networks (LLNs)? (Multiple Answers)

    A. Routers with high processing power and memory.
    B. Interconnects with high loss rates and low data rates.
    C. Stable network topologies.
    D. Nodes operating under energy constraints (e.g., battery power).

7. What distinguishes a DODAG from a general DAG in the context of RPL?

    A. DODAGs contain cycles, while DAGs do not.
    B. DODAGs have multiple roots, while DAGs have one.
    C. DODAGs are rooted at a single destination.
    D. DODAGs are only used for wired networks.

8. In an RPL-based DODAG, a node with multiple parents will typically choose which parent to use?

    A. The node with the highest rank
    B. The node with the lowest rank
    C. The most reliable path
    D. The node with the highest signal strength

9. To put an ESP-01 module into programming mode (for uploading firmware/code), which pin typically needs to be connected to GND?

    A. VCC
    B. TX
    C. GPIO0
    D. RST

10. NodeMCU development boards are generally preferred over bare ESP modules (like ESP-01) for easier prototyping because they include: (Multiple Answers)

    A. On-board voltage regulator (handles 5V USB input).
    B. Built-in sensors for temperature and humidity.
    C. USB-to-serial chip for direct programming and communication via USB.
    D. Pre-installed long-range LoRa radio.