

## IO4041 Introduction to Internet of Things – BCS Spring 2025 – Quiz 4

Roll # \_\_\_\_\_ Name \_\_\_\_\_ Section \_\_\_\_\_

1. Which layer is primarily responsible for finding energy-efficient routes in WSNs?
  - A. Physical Layer
  - B. Data Link Layer
  - C. Network Layer
  - D. Transport Layer
2. A sensor node typically consists of a sensor, a processor, a \_\_\_\_\_, and a power supply.
  - A. router
  - B. memory
  - C. battery
  - D. radio

*Either is correct*
3. How do magnetic sensors primarily detect vehicles for traffic control applications in WSNs?
  - A. By measuring the heat signature of the engine.
  - B. By detecting the sound of the vehicle.
  - C. By sensing the disturbance in the Earth's magnetic field caused by the vehicle's steel mass.
  - D. By using RFID tags attached to the vehicles.
4. Ad-hoc deployment, where sensors might be dropped from airplanes, necessitates which capability in sensor nodes?
  - A. High-speed data processing
  - B. Self-management (e.g., location determination, route discovery)
  - C. Long-range communication (over 1km)
  - D. Wired power source
5. In the context of RPL (Routing Protocol for Low-power and lossy networks), what is a DODAG?
  - A. A general directed acyclic graph with multiple roots.
  - B. A destination-oriented directed acyclic graph, typically rooted at a single border router.
  - C. A distributed objective directed acyclic graph for load balancing.
  - D. A dynamic on-demand directed acyclic graph.

6. RPL is designed primarily for which type of traffic pattern common in LLNs?
- A. Point-to-Point (P2P)
  - B. Point-to-Multipoint (P2MP)
  - C. Multipoint-to-Point (MP2P)
  - D. Anycast
7. LOADng (Lightweight On-demand Ad-hoc Distance vector routing protocol – next generation) is a \_\_\_\_\_ routing protocol, meaning routes are discovered \_\_\_\_\_.
- A. proactive, ahead of time
  - B. reactive, only when data needs to be sent
  - C. hybrid, using both proactive and reactive methods
  - D. static, configured manually
8. Which ESP chip was mentioned as popularizing low-cost WiFi for IoT applications?
- A. ESP32
  - B. ESP01
  - C. ESP8266
  - D. ESP-WROOM-32
9. The Arduino code snippet while (WiFi.status() != WL\_CONNECTED) is used to:
- A. Check if the ESP module is powered on.
  - B. Wait until the WiFi connection is successfully established.
  - C. Check if there is incoming data from the WiFi network.
  - D. Determine the signal strength of the WiFi connection.
10. Which of the following protocols can be used with ESP modules for communication with a web server? (Multiple Answers)
- A. HTTP
  - B. FTP
  - C. MQTT
  - D. Bluetooth

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1. The ability of a WSN node to adapt its configuration parameters based on system and environmental state is known as:
  - A. Self-healing
  - B. Self-optimization
  - C. Self-protection
  - D. Self-organization
2. Idle listening in WSNs contributes significantly to energy consumption at the \_\_\_\_\_ layer.
  - A. Network
  - B. Transport
  - C. Application
  - D. Medium Access Control (MAC)
3. Why is line-of-sight communication often impossible in underground mining environments for WSNs?
  - A. Due to excessive heat.
  - B. Due to high levels of dust interfering with optical sensors.
  - C. Due to the turns and twists of tunnels causing signal reflection and scattering.
  - D. Due to the magnetic properties of the rock.
4. What is the role of a 'Cluster Head' in a hierarchical WSN?
  - A. To monitor the base station
  - B. To aggregate data from multiple nodes
  - C. To ensure nodes stay connected to the network
  - D. To manage energy consumption
5. In an RPL DODAG, the 'Rank' of a node must:
  - A. Strictly decrease in the 'Up' direction (towards the root).
  - B. Strictly increase in the 'Up' direction (towards the root).
  - C. Remain constant for all nodes at the same hop count from the root.
  - D. Be randomly assigned upon joining the DODAG.

6. In RPL's "non-storing" mode, where is the routing information for downward paths (root-to-leaf) primarily maintained?
- A. Distributed across all nodes in the DODAG.
  - B. Only at the DODAG root.
  - C. At designated cluster heads within the DODAG.
  - D. It is not maintained; downward paths are discovered on demand.
7. In LOADng, what message is generated by an intermediate node upon receiving an RREQ?
- A. RERR (Route Error)
  - B. Another RREQ (Route Request)
  - C. RREP (Route Reply)
  - D. DAO (Destination Advertisement Object)
8. After programming an ESP-01, when connecting it to an Arduino for normal operation (e.g., Arduino sends sensor data to ESP), the TX/RX connections are typically:
- A. Arduino TX to ESP TX; Arduino RX to ESP RX (Parallel)
  - B. Arduino TX to ESP RX; Arduino RX to ESP TX (Crossed)
  - C. Connected via I2C pins.
  - D. Connected via SPI pins.
9. MicroPython is described as an implementation of \_\_\_\_\_ targeted for \_\_\_\_\_.
- A. Java, Web Servers
  - B. C++, Desktop Applications
  - C. Python 3.4, Microcontrollers
  - D. Lua, Mobile Devices
10. The ESP8266 and ESP32 both require \_\_\_\_\_ for programming via USB.
- A. USB-to-serial adapter
  - B. USB hub
  - C. Bluetooth connection
  - D. External SD card