B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Sixth Semester

Electronics and Communication Engineering

20ECEL602 - WIRELESS SENSOR NETWORKS

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	Which of the following is the function of a dedicated sensor? (a) Records and monitors physical condition of environment (b) Organizes collected data at a location that is centralized (c) Signal processing (d) both a and b	1	K1	CO1
2.	WSN measures _____ physical parameter. (a) Sound (b) Temperature (c) Pollution (d) All the above	1	K1	CO1
3.	WSN depends on _____ connectivity. (a) Wireless (b) Wired (c) RF (d) None of the above	1	K1	CO1
4.	The components of a sensor node is _____. (a) Radio trans receiver (b) Microcontroller (c) An electronic circuit (d) All the above	1	K1	CO2
5.	The energy source used in WSN are _____. (a) Battery (b) Inverter (c) Capacitor (d) None of the above	1	K1	CO2
6.	The cost of a sensor depends on _____ factors. (a) Area (b) Size (c) Complexity of design (d) All the above	1	K1	CO2
7.	Which of the following factors is most important in designing the physical layer of a wireless sensor network? (a) High data rate (b) Power efficiency (c) Complex modulation schemes (d) Large packet size	1	K1	CO3
8.	In WSN MAC protocols, reducing idle listening is important for which reason? (a) To maximize throughput (b) To minimize energy consumption (c) To avoid data packet collisions (d) To improve signal strength	1	K1	CO3
9.	Wakeup radios are designed to reduce power consumption by: (a) Keeping the transceiver active at all times (b) Putting the transceiver to sleep and waking up only for important events (c) Increasing transmission power (d) Increasing data rate	1	K1	CO3
10.	Which of the following is a common routing protocol used in WSNs? (a) OSPF (b) AODV (c) BGP (d) RIP	1	K1	CO4
11.	Routing protocols in WSNs are often designed with a focus on: (a) Maximizing data rate (b) Minimizing energy consumption (c) Ensuring maximum bandwidth (d) Reducing hardware costs	1	K1	CO4
12.	In energy-efficient routing, nodes usually select routes based on: (a) Shortest path regardless of energy cost (b) Paths that minimize overall energy consumption (c) Maximum throughput (d) Maximum latency	1	K1	CO4
13.	In topology control, adjusting the transmission power of nodes mainly helps to: (a) Increase data processing speed (b) Reduce interference and energy usage (c) Increase network latency (d) Minimize data packet size	1	K1	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13013**

14. In clustering, the role of a cluster head is to: *1   K1   CO5*
    (a) Collect data from other nodes and forward it to the base station
    (b) Track the locations of all nodes
    (c) Increase the transmission power of nodes
    (d) Reduce the overall size of sensor nodes
15. Which of the following is a key benefit of clustering in WSNs?   *1   K1   CO5*
    (a) Reducing node processing speed
    (b) Conserving energy by reducing long-distance transmissions
    (c) Increasing network security
    (d) Decreasing node lifespan
16. Time synchronization in wireless sensor networks is important because: *1   K1   CO5*
    (a) It allows nodes to conserve memory
    (b) It enables accurate data fusion and event detection
    (c) It reduces the transmission range of nodes
    (d) It eliminates data processing requirements
17. Berkeley Motes are primarily known for their application in: *1   K1   CO6*
    (a) Mobile phone networks
    (b) Wireless sensor networks (WSNs)
    (c) Satellite communications
    (d) Optical fiber networks
18. TinyOS is a popular operating system used in: *1   K1   CO6*
    (a) Laptops and desktops
    (b) Mobile phones
    (c) Wireless sensor networks (WSNs)
    (d) Satellite systems
19. COOJA is a simulation tool that is commonly used with which operating system?   *1   K1   CO6*
    (a) Windows OS
    (b) TinyOS
    (c) CONTIKIOS
    (d) FreeRTOS
20. TOSSIM, a simulator for WSNs, is designed to emulate which aspect of sensor networks?   *1   K1   CO6*
    (a) Graphical interfaces
    (b) Network communication and node interaction
    (c) High-performance computing tasks
    (d) Cloud computing

PART - B (10 × 2 = 20 Marks)
Answer ALL Questions

21. List the commercial applications of sensor networks.   *2   K1   CO1*

22. Define ad hoc networks.   *2   K1   CO1*

23. Compare active and passive sensors.   *2   K2   CO2*

24. Define self-organization of network.   *2   K1   CO2*

25. Compare on-demand protocols with proactive protocols.   *2   K1   CO3*

26. What are the protocols used for distributed demand assignment strategy?   *2   K1   CO3*

27. What is topology control, and why is it important in sensor networks?   *2   K1   CO4*

28. What criteria are often considered when choosing cluster heads in WSNs?   *2   K1   CO4*

29. What are the characteristics of Berkeley mote family?   *2   K1   CO5*

30. Mention three categories of sensor node hardware.   *2   K1   CO5*

PART - C (6 × 10 = 60 Marks)
Answer ALL Questions

31. a) Describe the characteristics of wireless sensor network.   *10   K2   CO1*

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13013**

b) Summarize the challenges and the required mechanisms of a wireless sensor network.	10	K2 CO1

32. a) Explain energy consumption during the transmission and reception of a signal in WSN with the supporting equations.   10   K2   CO2

OR

b) Illustrate the sensor network architecture and describe the components in detail.   10   K2   CO2

33. a) Explain the impact of S-MAC protocol in a network with suitable diagrams.   10   K2   CO3

OR

b) Explain any three schedule based MAC protocols of wireless sensor network.   10   K2   CO3

34. a)(i) Which routing is more suitable for WSN? Explain the reasons.   5   K2   CO4
    (ii) Exhibit the features of the IEEE 802.15.4 MAC protocol.   5   K2   CO4

OR

b) Explain the LEACH routing with the help of neat diagram. Give its advantages and disadvantages.   10   K2   CO4

35. a) Explain how clustering improve the scalability and energy efficiency of sensor networks, and what are the potential pitfalls of relying on cluster heads?   10   K2   CO4

OR

b) What are the main challenges in achieving reliable time synchronization across a dynamic and distributed network, and how do environmental factors influence these synchronization methods?   10   K2   CO4

36. a) Describe the components and implementation models of Timer functions in nesC.   10   K2   CO5

OR

b) Explain the characteristics and components of node-level simulator with necessary functions.   10   K2   CO5