

WIRELESS SENSOR NETWORKS
(ECEN 4246)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) Term SINR stands for
 - (a) Signal to Interference plus Noise Ratio
 - (b) Signal to Noise Ratio
 - (c) Signal Interval Noise Reading
 - (d) Series Insert Resistance.
- (ii) Which electronic circuit interfaces with which one of the component's of WSN
 - (a) Sensors
 - (b) Energy sources
 - (c) Sensor and energy source
 - (d) None of the above.
- (iii) A process that selects paths for traffic in a network is called
 - (a) Routing
 - (b) Flooding
 - (c) Connecting
 - (d) Both (a) and (b).
- (iv) Which of the following is the power sources used in WSN?
 - (a) Renewable energy
 - (b) Perpetual
 - (c) Both (a) and (b)
 - (d) None of the above.
- (v) Which of the following are the characteristics of WSN?
 - (a) Heterogeneity
 - (b) Homogeneity
 - (c) Ease of use
 - (d) All the above.
- (vi) A radio transceiver in WSN contains which component internally?
 - (a) Antenna
 - (b) Wire
 - (c) Electrode
 - (d) None of the above.
- (vii) LEACH is self-organizing, adaptive _____ protocol in which sensor nodes will organize themselves into _____ clusters and cluster members elect cluster head?
 - (a) unit, cost
 - (b) non recurring, engineering
 - (c) unit, big
 - (d) clustering, local
- (viii) Which energy source is used in WSN designs?
 - (a) Battery
 - (b) Inverter
 - (c) Capacitor
 - (d) Convertor.

- (ix) The cost of a sensor depends on _____ factors.
 (a) area (b) size
 (c) complexity of design (d) all of Above
- (x) For reliable data transport, even when an event has been reliably detected, this information must be transported over _____ hops towards special sink or _____ and further to the user.
 (a) zero, one path (b) multiple, gateway nodes
 (c) one, two path (d) zero, two path

Fill in the blanks with the correct word

- (xi) A _____ sensing system is inherently more robust against individual sensor node or link failures, because of redundancy in the network.
- (xii) Wireless networks are computer networks that use radio frequency channels as their _____ for communication.
- (xiii) A sensor network in WSN can be of _____ topology.
- (xiv) A star network is implemented using _____ distribution paradigm in computer networks.
- (xv) Standards-based systems provide the assurance that all equipment manufactured to the same standard will be _____.

Group - B

2. (a) Explain the necessities of the three subsystems of any sensor node. [[CO1](Understand/LOCQ)]
 (b) Discuss in details different applications of sensor networks. [[CO2](Analyse/IOCQ)]
 (c) Construct the differences between Ad Hoc wireless networks and wireless sensor networks. [[CO2](Analyse/IOCQ)]
4 + 4 + 4 = 12
3. (a) Reflect on the issues and challenges in designing a sensor network. [[CO2](Analyse/HOCQ)]
 (b) Discuss layered architecture and clustered architecture. What is the need of UNPF? [[CO1](Design/HOCQ)]
6 + (3 + 3) = 12

Group - C

4. (a) Compare between the mechanisms of Flooding, Gossiping & Rumor Routing. [[CO3](Analyse/IOCQ)]
 (b) What are the MAC protocols that can be deployed in a sensor network? Discuss in brief. [[CO4](Apply/IOCQ)]
6 + 6 = 12
5. (a) Discuss about LEACH protocol and its relative advantages. [[CO3](Analyse/IOCQ)]
 (b) Why sleep scheduling is needed in a wireless sensor network? [[CO4](Analyse/IOCQ)]

- (c) Describe briefly the sensor protocols via negotiation. [[CO3](Understand/LOCQ)]
6 + 3 + 3 = 12

Group - D

6. (a) Compare the role of centralized control in traditional and distributed network. [[CO5](Analyse/HOCQ)]
 (b) What are the parameters that characterize the basic functions of a sensor network? Explain in details. [[CO6](Remember/LOCQ)]
6 + 6 = 12
7. (a) Briefly explain about the sensor network programming challenges. [[CO4](Remember/LOCQ)]
 (b) What is energy efficient routing? What are the various time synchronization algorithms? [[CO4](Understand/LOCQ)]
 (c) Discuss about few new applications of WSN. [[CO5](create/HOCQ)]
4 + 4 + 4 = 12

Group - E

8. (a) How congestion control can be taken care of in a WSN? Create an application view point analysis. [[CO5](Create/HOCQ)]
 (b) Why do we need resynchronization over synchronization in a wireless sensor network? [[CO6](Apply/IOCQ)]
6 + 6 = 12
9. (a) Discuss the need of Energy management in WSN. [[CO6](understand/LOCQ)]
 (b) Explain certain Security issues and its relevant solutions. [[CO6](understand/LOCQ)]
6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	34.33	32.29	33.33

Course Outcome (CO):

After the completion of the course students will be able to

1. Understand the differences between Ad Hoc wireless networks and Sensor networks.
2. Analyze the properties of WSN.
3. Compare performances of sensors and protocols.
4. Find causes of problem in WSN and to solve them.
5. Develop new applications of WSN.
6. Form ideas about new sensors and efficient protocols for new applications.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*

