

**WIRELESS SENSOR NETWORKS
(ECEN 4246)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (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) An OS for WSN should provide implementations of communication protocols that support _____ multimedia streams.
 - (a) real-time
 - (b) short-time
 - (c) discontinued
 - (d) network
 - (iii) 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
 - (iv) 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.
 - (v) A process that selects paths for traffic in a network is called
 - (a) routing
 - (b) flooding
 - (c) connecting
 - (d) both (a) and (b).
 - (vi) 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.
 - (vii) Information about Angle of Area measurement is obtained from receiver Antennas _____ and _____ response.
 - (a) amplitude, phase
 - (b) gain, weight
 - (c) height, gain
 - (d) power, modulus

- (viii) Which of the following are the characteristics of WSN?
(a) Heterogeneity (b) Homogeneity
(c) Ease of use (d) All the above.
- (ix) In flooding mechanism, each sensor receives a data packet and then _____ it to all neighbouring nodes.
(a) broadcasts (b) hide
(c) stops (d) erases
- (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.

Group - B

2. (a) What is a WSN? Describe its ISO-OSI architecture with different layers? What are its uses? [(C01)(Remember/LOCQ)]
(b) What are the difference between a WSN network and an Adhoc network? [(C02)(Understand/LOCQ)]
(1 + 5 + 2) + 4 = 12
3. (a) With a neat diagram, explain the sensor network architecture. [(C02)(Remember/LOCQ)]
(b) Analyse the Key design challenges in WSN in comparison with Ad Hoc wireless networks. [(C03)(Analyze/IOCQ)]
6 + 6 = 12

Group - C

4. (a) Name a few standards that are currently used to ratify the WSN networks to maintain quality. Discuss how these quality standards are applied across the ISO-OSI WSN layers. [(C04)(Remember/LOCQ)]
(b) What is data flooding, data gossiping, and rumor routing explain with examples? [(C04) (Analyze/LOCQ)]
(2 + 4) + (2 + 2 + 2) = 12
5. (a) In WSN under network layered protocol what is the use of the “low - energy adaptive clustering hierarchy (LEACH)” protocol. [(C03)(Understand/HOCQ)]
(b) What is the importance of SINR? In which ISO-OSI layer of WSN is it considered? [(C04)(Understand/LOCQ)]
(c) Describe the active state and sleep state scheduling of sensors for WSN protocols. [(C04)(Analyze/IOCQ)]
4 + 4 + 4 = 12

Group - D

6. (a) Why is localization important to WSN? [(CO4)(Remember/LOCQ)]
 (b) Discuss WSN localization for (i) Anchor based and Anchor free schemes. [(CO5)(Remember/HOCQ)]
 (ii) Centralized and Distributed Scheme.
 (c) Mention key issues in localization approaches. [(CO4)(Analyze/IOCQ)]
2 + 6 + 4 = 12
7. (a) Describe time synchronization in WSN. [(CO5) (Remember/LOCQ)]
 (b) Illustrate with example three methods of synchronization used for WSN. [(CO5)(Understand/LOCQ)]
6 + 6 = 12

Group - E

8. (a) Reflect your understanding on Transport reliability & Congestion control. [(CO6)(Remember/LOCQ)]
 (b) Explain in detail the node level software platform featuring how new sensors and efficient protocols for new applications can be derived. [(CO6)(Analyze & Apply/IOCQ)]
6 + 6 = 12
9. (a) Illustrate the concept of data centric networking in association with WSN with examples. [(CO1)(Remember/LOCQ)]
 (b) Justify the use of real time OS with WSN systems. [(CO2)(Understand/IOCQ)]
 (c) List the security issues in WSN associated with routing. [(CO2)(Analyze/IOCQ)]
4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	47.92	41.66	10.42

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

