

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) WSN is a subset of
 - (a) Dynamic Adhoc network
 - (b) Static Adhoc network
 - (c) MAC layer
 - (d) Transport layer
- (ii) The WSN OSI Transport layer is responsible for
 - (a) Shortest and best routing Path detection
 - (b) Power Saving
 - (c) Data reliability and congestion avoidance
 - (d) All the above choices
- (iii) Challenges involved with WSN network
 - (a) Energy efficient reliable routing
 - (b) Power saving at the nodes
 - (c) Reliable transmission of data
 - (d) All the above choices
- (iv) In WSN, communication the energy costly aspect of the network, can be organized as
 - (a) Data centric
 - (b) Node centric
 - (c) Position centric
 - (d) All of the above
- (v) In WSN the LEACH routing protocol stands for
 - (a) Least Expectancy Average Cluster Hierarchy
 - (b) Low Energy Adaptive Clustering Hierarchy
 - (c) Levelled Energy Acceptable Cluster Hierarchy
 - (d) Like Expectation Average Clustering Hierarchy
- (vi) Localization is estimated through
 - (a) Time out option
 - (b) Synchronization
 - (c) Direct placement and search
 - (d) Communication between localized node and unlocalized node for determining their geometrical placement

- (vii) Time synchronization in node localization is important for
 - (a) Accurate distance estimation based on time of arrival of signals
 - (b) Reduce error by clock drift or skew
 - (c) Enable efficient resource coordination reducing collision
 - (d) All of the above
- (viii) Which is a major Security threat in WSN node localization work
 - (a) Jamming attack
 - (b) Wormhole attack
 - (c) Time synchronization attack
 - (d) All of the above
- (ix) Wireless Sensor Network data transport is handled by
 - (a) Physical Layer
 - (b) Data Link Layer
 - (c) Network Layer
 - (d) Transport Layer
- (x) Secured Key Management prevents
 - (a) Unauthorized data packet access
 - (b) Unauthorized node access
 - (c) Unauthorized network control access
 - (d) All of the above

Fill in the blanks with the correct word

- (xi) WSN network standards are based on _____ standard.
- (xii) WSN is classified under _____ Adhoc wireless networks.
- (xiii) WSN Wireless communication uses _____ wave propagation mechanism.
- (xiv) Secured Key Management prevents _____.
- (xv) In WSN the _____ layer determines channel access, with schedules, does data buffer management and error control

Group - B

- 2. (a) Compare the differences between the various contention based protocols. [[C03](Analyse/HOCQ)]
 (b) Draw and explain MAC protocol with a neat diagram. [[C01](Remember/LOCQ)]
6 + 6 = 12
- 3. (a) Discuss the major security threats in Ad Hoc wireless network. [[C03](Analyse/HOCQ)]
 (b) What role does the routing protocol play in assuring QoS for Ad Hoc networks? [[C04](Remember/LOCQ)]
6 + 6 = 12

Group - C

- 4. (a) Explain Hybrid Coordination Function. [[C03](Analyse/HOCQ)]
 (b) Evaluate what are the issues and challenges in providing QoS in Wireless Sensor Networks. [[C04](Remember/LOCQ)]
6 + 6 = 12
- 5. (a) "TCP is the most sought after protocol in internet today"- Justify. [[C03](Analyse/HOCQ)]

- (b) What are the features of HCF? [[C04](Remember/LOCQ)]
 (c) Describe briefly the problems and solutions in achieving window management system in Ad Hoc networks? [[C02](Apply/IOCQ)]
4 + 2 + 6 = 12

Group - D

6. (a) What are the advantages of range free localization method? [[C03](Analyse/HOCQ)]
 (b) How does multilateration work in node localization? [[C04](Remember/LOCQ)]
 (c) Describe what is under a centralized and a distributed scheme, for WSN node localization problem? [[C02](Apply/IOCQ)]
4 + 4 + 4 = 12
7. (a) How does triangulation method work in node localization? [[C03](Analyse/LOCQ)]
 (b) We have two anchor nodes, A (0, 0) and B (4, 0), with known positions? We want to determine the position (xc, yc) of an unlocalized node C (xc, yc) using the angles between the nodes which is known. Given angle at node A = 45 degree, and angle at node B = 60 degree. [[C04](Remember/HOCQ)]
4 + 8 = 12

Group - E

8. (a) Describe how adaptive routing protocol LEACH (Low Energy Adaptive Clustering Hierarchy) adapt to WSN network condition to avoid congestion. [[C06](Analyse/LOCQ)]
 (b) Describe how a priority based scheduling technique in WSN prioritize critical data packets to ensure timely delivery while managing congestion? [[C04](Remember/LOCQ)]
 (c) What are the issues in the above congestion control technique and how to overcome them? [[C05](Apply/IOCQ)]
4 + 6 + 2 = 12
9. (a) Explain how "Spoofing" affect WSN network communication and how it can be prevented. [[C04](Analyse/LOCQ)]
 (b) Explain how Black hole routing attack can affect WSN network communication? [[C05](Remember/LOCQ)]
 (c) Describe how DoS (Denial of Service) attack can affect WSN network communication? [[C05](Apply/IOCQ)]
 (d) Describe energy depletion attack where targeted nodes are made to perform unnecessary task and drain power. [[C06](Apply/IOCQ)]
3 + 3 + 3 + 3 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	45.84	18.75	35.41

