

AD HOC NETWORKS AND SECURITY
(ECEN 4144)

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) Wireless path impediment is due to
 - (a) interference
 - (b) multi-path propagation
 - (c) attenuation
 - (d) all of the above.
- (ii) Which is not a design goal of MAC protocol for Ad-hoc network?
 - (a) Distributed operation of the protocol
 - (b) QOS support for real time traffic
 - (c) High control overhead use
 - (d) Available BW use efficiently.
- (iii) Ad Hoc Wireless Networks are
 - (a) infrastructure less network
 - (b) fixed infrastructure network
 - (c) both (a) and (b)
 - (d) none of the above.
- (iv) WRP protocol is
 - (a) Proactive
 - (b) Reactive
 - (c) Hybrid
 - (d) Flat topology based.
- (v) In AODV, the source node and the intermediate nodes store the
 - (a) Complete path information
 - (b) Complete topology information
 - (c) Next-hop information
 - (d) None of the above.
- (vi) In table-driven routing protocols, every node maintains the
 - (a) neighboring node information
 - (b) all node information
 - (c) network topology information
 - (d) none of the above.
- (vii) Which is not a Major responsibility of TCP?
 - (a) Congestion control
 - (b) In-order delivery of packets
 - (c) Flow control
 - (d) Make use of directional antennas.
- (viii) Which is not a Network security requirement?
 - (a) Confidentiality
 - (b) Integrity
 - (c) Synchronization
 - (d) Availability

- (ix) Lazy packet scheduling scheme is
 (a) a security protocol to prevent data loss
 (b) a protocol to avoid hidden terminal problem
 (c) a protocol for battery aware scheduling technique and maximize packets transmitted
 (d) a protocol for better synchronization among nodes.
- (x) Which one of the following is not a function of network layer?
 (a) Routing (b) Inter-networking
 (c) Congestion control (d) Error control.

Fill in the blanks with the correct word

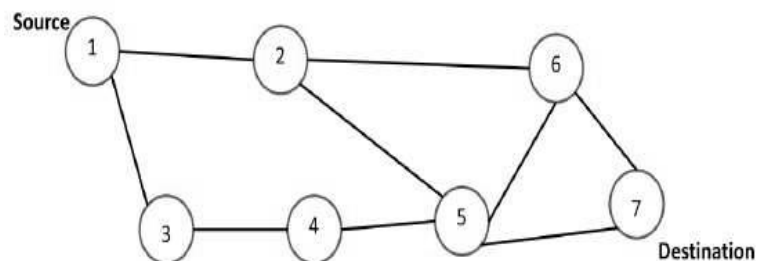
- (xi) In the _____ attack an attacker receives packets at one location in the network and tunnels them to another location in the network, where the packets are resent into the network.
- (xii) A radio wave propagation mechanism is _____.
- (xiii) WSN is classified under _____ Ad-hoc wireless network
- (xiv) The routing decisions in Power-aware routing protocols are based on minimizing the power consumption either _____.
- (xv) _____ occurs when both nodes transmit packets at the same time without knowing about the transmission of each other.

Group - B

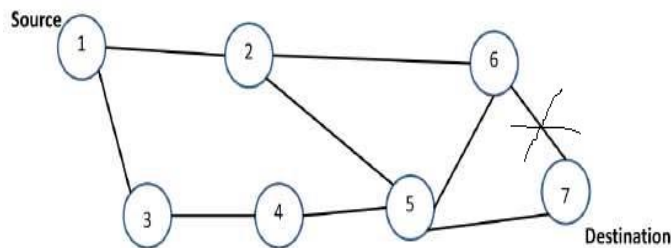
2. (a) Between radio waves and gamma waves which frequency band is preferred for Ad-hoc network and why? [[C01](Remember/LOCQ)]
 (b) Why is CSMA/CD protocol not preferred for wireless Ad-hoc networks? [[C02](Understand/LOCQ)]
 (c) Explain how multipath propagation affects signal quality. [[C02](Apply/IOCQ)]
 (d) Calculate the maximum achievable data rate over a 9 KHz channel whose SNR is 20db. [[C02](Apply/IOCQ)]
3 + 3 + 3 + 3 = 12
3. (a) Explain with reasons, which protocol is more bandwidth efficient, RTMAC or MACA/PR? [[C03](Analyse/HOCQ)]
 (b) A particular cellular system has the following characteristics: cluster size = 7, uniform circular cell size, user density = 100 users/sq km, allocated frequency spectrum = 900 – 949 Mhz, bit rate required per user = 10 kbps uplink and 10 kbps downlink, and modulation code rate = 1bps/Hz. Calculate the average cell radius for the above system if FDMA/FDD is used. [[C03](Apply/IOCQ)]
 (c) What are the advantages and disadvantages of MAC protocols using directional antennas? [[C03](Understand/LOCQ)]
4 + 4 + 4 = 12

Group - C

4. (a) Evaluate the differences in topology reorganization in DSDV and CGSR routing protocol. [[CO3](Evaluate/HOCQ)]
 (b) Is a table driven routing protocol suitable for high mobility environment? [[CO4](Remember/LOCQ)]
 (c) Describe briefly the route establishment in CGSR network protocol. [[CO4](Apply/IOCQ)]
4 + 4 + 4 = 12
5. (a) In the ad hoc communication network below using DSDV (Destination Sequenced Distance Vector Protocol), with Node 1 as source, and Node 7 as destination, find the routing table for Node 1, with the destination id field, next node id, and the distance information. [[CO4](Evaluate/HOCQ)]



- (b) With node re-arrangement if the communication link between nodes 6 and 7 breaks then show the modified routing table for Node 1.



[[CO4](Analyse/IOCQ)]
6 + 6 = 12

Group - D

6. (a) Describe the network security requirements for Ad-hoc wireless network. [[CO5](Analyse/IOCQ)]
 (b) List the issues and challenges in security provisioning for Ad-hoc wireless network. [[CO5](Remember/LOCQ)]
 (c) Describe the Byzantine attack. [[CO5](Remember/LOCQ)]
4 + 4 + 4 = 12
7. (a) Present a comparison of TCP solutions for wireless Adhoc networks. [[CO4](Remember/LOCQ)]
 (b) Identify the major reasons behind that TCP not perform well in Ad hoc Networks. [[CO4](Remember/IOCQ)]
6 + 6 = 12

Group - E

8. (a) Determine the impact of the following security threats in WSN: (i) Black hole attack (ii) Wormhole attack. *[[CO5](Analyse/HOCQ)]*
(b) Generalize the active and passive attacks with suitable examples. Also explain how these attacks differ from each other. *[[CO5](Analyse/IOCQ)]*
7 + 5 = 12
9. (a) Examine about the network-layer attacks in security provisioning. *[[CO5](Analyse/HOCQ)]*
(b) Identify the Key management schemes in Wireless Sensor Networks. Illustrate the key distribution and management mechanism required for secure communication in sensor networks. *[[CO5](Analyse/IOCQ)]*
6 + 6 = 12
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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	29.17	42.7	28.13