

**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) A Static Adhoc network is  
(a) MANET (Mobile ad hoc network)  
(b) VANET (Vehicular ad hoc network)  
(c) WSN (Wireless sensor network)  
(d) SPAN (Smart phone ad hoc network).
- (ii) The binary exponential backoff algorithm is used when  
(a) The packet transmitted by the node is lost  
(b) The packet is too big in size  
(c) Faster transmission is required  
(d) CTS packet is not send by sender.
- (iii) Challenge in routing protocol is?  
(a) Reliability (b) Mobility  
(c) Security (d) All of (a), (b) & (c).
- (iv) A Contention based Receiver Initiated protocol is  
(a) RI-BTMA (b) MACAW  
(c) BTMA (d) CATA.
- (v) In which network protocol, after source broadcasts RouteRequests the destination originates RouteReply packet with the full return path information?  
(a) DSDV (b) WRP  
(c) DSR (d) CGSR.
- (vi) What is the goal of congestion control?  
(a) Making sure that subnet is not able to carry the offered traffic  
(b) Making sure that subnet will allow more than the offered traffic  
(c) Making sure that subnet is allowed to carry the offered traffic  
(d) Making sure that subnet will not allow any traffic.

- (vii) Traditional TCP does not perform well in Ad hoc wireless networks for
  - (a) misinterpretation of packet loss
  - (b) frequent path breaks
  - (c) effect of path length
  - (d) all of (a), (b) & (c).
- (viii) Which is not a main reason for energy management in ad hoc network?
  - (a) Hidden terminal problem
  - (b) Limited Energy Reserve
  - (c) Lack of Central Coordination
  - (d) Channel Utilization
- (ix) In TCP-F, the intermediate node that originates the RFN packet is called the?
  - (a) Failure point (FP)
  - (b) Failure node (FN)
  - (c) Active node (AN)
  - (d) Active point (AP).
- (x) For wormhole attack in targeted layer in the protocol stack is
  - (a) Physical and MAC layers
  - (b) Network layer
  - (c) Application layer
  - (d) Multi layer.

*Fill in the blanks with the correct word*

- (xi) Hidden terminal problem is due to \_\_\_\_\_.
- (xii) Sender initiated protocol is an example for \_\_\_\_\_
- (xiii) \_\_\_\_\_ occurs when both nodes transmit packets at the same time without knowing about the transmission of each other.
- (xiv) RTS full form is \_\_\_\_\_.
- (xv) The Reactive network protocol example is \_\_\_\_\_.

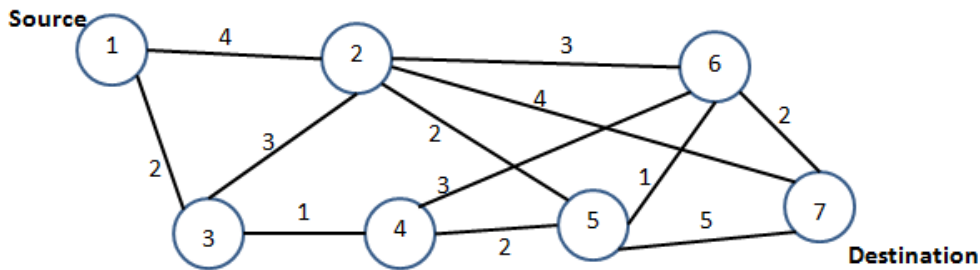
### Group - B

- 2. (a) Differentiate between cellular network and an ad hoc network. [[CO1](Remember/LOCQ)]
- (b) What is TCP? Discuss with an example TCP over Ad Hoc wireless networks. [[CO4](Understand/LOCQ)]
- 6 + 6 = 12**
- 3. (a) Explain the hidden terminal and exposed terminal problems and the common methods used to avoid them. [[CO1](Analyse/LOCQ)]
- (b) Between MAC protocols BTMA and MARCH which is more efficient and why? [[CO4](Remember/LOCQ)]
- (c) MAC layer belongs to which section of OSI model? [[CO2](Apply/IOCQ)]
- 6 + 4 + 2 = 12**

### Group - C

- 4. (a) Analyse the operation of destination sequenced distance vector routing protocol with an example. [[CO3](Analyse/IOCQ)]
- (b) Describe the issues related to routing protocol for ad hoc wireless networks. [[CO3] (Remember/LOCQ)]
- 6 + 6 = 12**

5. (a)

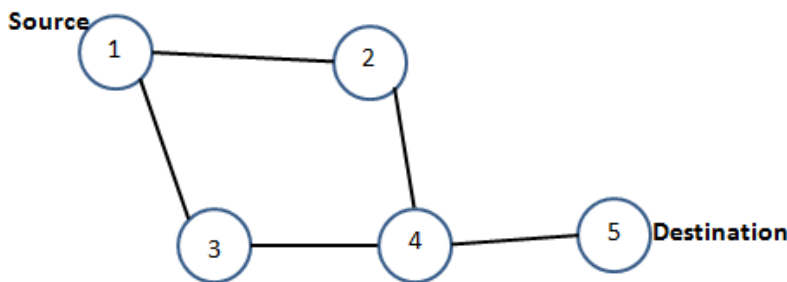


In the above AdHoc wireless communication network using Wireless Routing Protocol (WRP), with Node 1 as source and Node 7 as destination, find the table of routing entry at each node for the destination Node 7, showing the (i) Node id, (ii) Successor node id, (iii) Predecessor node, and (iv) and the Cost involved, as each table row entry.

*[[CO5](Analyse/HOCQ)]*

(b) With node re-arrangement in problem of figure of 4a, if the communication link between Nodes 6 and 7 breaks then show the modified table. *[[CO5] (Remember/LOCQ)]*

(c)



With the above ad-hoc wireless network explain the route establishing between Source Node 1 and Destination Node 5 using DSR (Dynamic Source Routing) protocol, using the RREP (route request) packet and RREQ (route reply) packet paths.

*[[CO5](Apply/IOCQ)]*

$$6 + 2 + 4 = 12$$

### Group - D

6. (a) What are the design goals of Transport Layer protocol for adhoc network? *[[CO3](Analyse/LOCQ)]*

(b) Mention four major reasons behind an Adhoc TCP throughput degradation? *[[CO4](Remember/LOCQ)]*

(c) What is TCP congestion window? *[[CO2](Apply/IOCQ)]*

$$4 + 4 + 4 = 12$$

7. (a) Obtain the possible countermeasures to alleviate the denial-of-service attacks. *[[CO6](Obtain/HOCQ)]*

(b) Explain how the security can be improved by minimizing the attacks in sensor networks? *[[CO4](Analyse/IOCQ)]*

$$6 + 6 = 12$$

### Group - E

8. (a) Illustrate the route selection process in Dynamic Source Routing protocol. *[[CO4](Understand/LOCQ)]*

- (b) Generalize the essential aspects of power supply for an untethered wireless sensor node. [[CO5](Analyse/IOCQ)]  
**6 + 6 = 12**
9. (a) What are the network security requirements for ad hoc wireless network? [[CO3](Analyse/LOCQ)]  
 (b) Explain the network layer Black hole attack? [[CO4] (Remember/LOCQ)]  
 (c) What are the main reasons for energy management in ad hoc wireless network? [[CO2](Apply/LOCQ)]  
**4 + 4 + 4 = 12**
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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	58.33	29.17	12.5

**Course Outcome (CO):**

After completing this course, the student will be able to:

1. Understand the underlying technologies of wireless networks.
2. Analyse the various design issues and challenges of Ad hoc (wireless) Networks.
3. Learn different routing protocols and their working.
4. Learn and analyse end to end transmission schemes.
5. Understand network design strategies and QoS.
6. Our students will be able to take up research work in communication domain.

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