AD HOC WIRELESS NETWORKS
(ECEN 4127)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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)   The hidden and exposed terminal problems significantly reduce
         (a) Mobility   (b) Security
         (c) Throughput   (d) All of the above.

   (ii)   Major advantages of hybrid wireless network.
         (a)   Higher capacity than cellular networks
         (b)   Increased flexibility and reliability in routing.
         (c)   Both (a) and (b)
         (d)   None of the above.

   (iii)   The contention mode of MAC implementation is best suited for __ traffic.
         (a) Low   (b) Medium   (c) High   (d) Very High.

   (iv)   Access delay refers to
         (a)   Maximum delay that any packet experiences
         (b)   Minimum delay that any packet experiences
         (c)   Average delay that any packet experiences
         (d)   All of the above.

   (v)   Challenges that a routing protocol faces are
         (a) Mobility   (b) Bandwidth constraint
         (c) Location dependent contention   (d) All of the above.

   (vi)   In a contention mode of MAC implementation, each station in the network ___ data at the same time whether a collision occurs or not
         (a) can transmit   (b) can not transmit
         (c) Can't say   (d) None of the above.

   (vii)   Which is a Hybrid Routing Protocol?
         (a) DSR   (b) AODV   (c) AODV   (d) ZRP

(viii) The major performance degradation faced by a reliable connection-oriented transport layer protocol such as transmission control protocol (TCP) in an ad hoc wireless network arises due to
(a) Frequent path breaks   (b) High channel error rate
(c) Frequent network partitions   (d) All of the above.

(ix) AODV protocol is based on
(a) DSDV   (b) DSR   (c) MACAW   (d) none of these

(x) RTR – the full form is
(a) ready to try   (b) ready for transmission
(c) ready to receive   (d) retry.

Group – B

2. (a) State the difference between Cellular Network and Ad Hoc Wireless Network.
   [[CO1,CO2] Analyze/IOCQ]]
   (b) Outline the design challenges in wireless sensor network.
   [[CO1,CO2] Apply/ IOCQ]]
   (c) Explain the applications areas of ad hoc networks. What are the difference between static and dynamic ad hoc networks?
   [[CO1,CO2, CO6] Remember/LOCQ , Analyze/IOCQ]]

   4 + 3 + (2 + 3) = 12

3. (a) Write down the issues of designing a MAC protocol for Ad-hoc networks.
   [[CO1,CO2,CO4][Analyze/IOCQ]]
   (b) What are the advantages of reservation based MAC protocols over contention based MAC protocols? Describe the common method used in alleviating the hidden terminal problem at the MAC layer.
   [[CO2,CO4][Understand/ LOCQ, Apply/ IOCQ]]

   4 + (4 + 4) = 12

Group – C

4. (a) List some of the characteristics of a routing protocol for ad hoc wireless networks. [[CO2,CO3] [Remember/LOCQ]]
   (b) Write down the difference between Proactive routing and Reactive routing.
   Outline the DSR Routing protocols with neat diagram.
   [[CO3,CO6][Analyze/IOCQ, Evaluate/HOCQ]]

   4 + (4 + 4) = 12

5. (a) How is the loop free property ensured in on demand routing protocol with the help of a suitable network model? [[CO3, CO6][Evaluate / HOCQ]]
   (b) Differentiate the functionality for intra-zone and inter-zone routing protocol in Hybrid routing.
   Draw a network model and explain multicast routing scheme.
   [[CO3, CO6][Analyze/IOCQ, Apply/IOCQ]]

   5 + (3 + 4) = 12

Group – D

6. (a) What are the designing goals of a transport layer protocol for Ad-hoc scenario?
[[CO2, CO5] [Understand/LOCQ]]
   (b) With a suitable network model, explain the operation of TCP-F.
What additional state information is to be maintained at the FP in TCP-F?
[[CO2, CO3, CO6][Analyze/IOCQ, Evaluate/HOCQ]]

5 + (3 + 4) = 12

7. (a) Illustrate the operation of Ad hoc TCP with neat diagram.
[[CO2, CO6] Analyze/IOCQ]]
   (b) What is the impact of the failure of proxy nodes in split –TCP?
State the disadvantages of split TCP.
[[CO2, CO6][Evaluate/HOCQ][Understand/LOCQ]]

5 + (3 + 4) = 12

Group – E

8. (a) What are the factors affecting QoS in Ad Hoc Wireless Networks?
[[CO2, CO5][Understand/LOCQ]]
   (b) What are the advantages of distributed power control algorithms in ad hoc wireless networks over the centralized power control algorithms?
[[CO2, CO5][Analyze/IOCQ]]
   (c) Comment on following:
(i) Hard QoS versus soft QoS approach
(ii) Stateful versus stateless approach.
[[CO2, CO5][Analyze/IOCQ, Apply/IOCQ]]

2 + 4 + (3 + 3) = 12

9. Write short notes on any three of the following: **(4 × 3) = 12**
(i) Contention based MAC protocols.
(ii) Link Reversal Algorithm.
(iii) Sliding-window-based transmission
(iv) Clustering in ad hoc wireless networks.
        [Understand/IOCQ [CO2, CO3, CO4, CO5]

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	21.88 %	61.45%	16.67%

Course Outcome (CO):
After completing the course the student will be able to:
1. Understand the under lying technologies of wireless communication networks.
2. Analyze the various design issues and challenges of Ad hoc Networks.
3. Different routing protocols and their operations will be clear to them.
4. Learn about the contention in MAC layer and ways to solve them.
5. Students will be familiar with the network design strategies to assure adequate QoS.

6. Apply their knowledge to develop new and improved applications.

Department & Section	Submission link:
IT	https://classroom.google.com/c/NDA1MzU2NjU2MTEw/a/NDYzOTkwMzc5MjE1/details