Ad Hoc and Sensor Networking
(ECEN 6132)

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 alternatives for the following: **10 x 1=10**

(i) Which of the following is a pro-active routing protocol for MANETS?
(a) DSR (b) DSDV
(c) AODV (d) all of these.

(ii) Mobile Ad hoc networks typically communicates at frequencies between
(a) 300 Mhz – 3 GHz (b) 30Mhz – 5 Ghz
(c) 1Ghz-3 Ghz (d) none of these.

(iii) Antennas used in Ad hoc networks are
(a) yagi-uda (b) horn
(c) array (d) omnidirectional.

(iv) MACA-BI is a hand-shake mechanism with :
(a) 3 steps (b) 4 steps
(c) 2 steps (d) 5 steps.

(v) A wireless LAN found in trains like Rajdhani Express is an example of
(a) public wireless LAN (b) Infrastructure WLAN
(c) ad hoc wireless LAN (d) none of these.

(vi) Sources are said to be of primary type if they have
(a) high TX power (b) more than one channel
(c) allocated fixed BW (d) all of these.

(vii) Which one is a passive attack in MANETS?
(a) Blackhole (b) Wormhole
(c) Jamming (d) Snooping.

(viii) Multiple access technique is used by IEEE 802.11 for WLAN is
(a) ALOHA (b) CSMA/CA
(c) CDMA (d) none of these.

(ix) In DSDV routing table, the 'distance' representation is in
(a) Metres (b) Feet
(c) Kms (d) Number of hops.

(x) Sensor networks are
(a) Address centric (b) Data centric
(c) Location centric (d) None of these.

Group – B

2.(a) What are the major constraints in a Mobile Ad hoc network which are also the challenges?

(b) What are the salient features of Dynamic source routing?

6 + 6 = 12

3.(a) What is the difference between pro-active and on-demand routing protocols? Give examples of each. Show how a route is established using DSDV protocol for an Ad Hoc wireless network consisting of 12 nodes.

(b) What is the function of 'Route Error' packets in DSR? Explain clearly.

(3+6) + 3 = 12

Group – C

4.(a) Explain the term 'desensitization' of a radio receiver. Show how this phenomenon may occur in a micro-controller based radio receiver.

(b) In a multi-channel radio receiver, the SINAD for channel X is 18 dB at specified RF input signal strength. For the same RF input, the SINAD for channel Y is 6 dB. Assuming that the degradation of SINAD is only due to platform noise of the radio, design a circuit so that the interference is eliminated for channel Y. Explain the operation of the circuit.

(2+4) + 6 = 12

5. What are the major constraints/issues in designing a suitable MAC protocol for Ad hoc wireless networks? Explain in details issues related to synchronization and Mobility of the nodes.

(6+2+4) = 12

Group – D

6.(a) What is meant by spectrum utilisation? Express mathematically (i) spectrum utilization and (ii) spectrum utilisation efficiency. Hence, find out the relationship between the two.

(b) What are the techniques applied to improve spectrum utilization? Explain how (i) GAN and (ii) Cognitive radios help to improve spectrum efficiency.

6 + 6 = 12

7.(a) What is Address Resolution protocol? How this works with adapters and datagrams?

(b) Highlight advantages and disadvantages of Bandwidth efficient multicast routing protocols.

(2+6) + 4 = 12

Group – E

8.(a) What are the differences between ad hoc and sensor wireless networks? Describe some of the challenges of a well-designed sensor network.

(b) Explain clustered architecture. What is LEACH? How is the cluster-head selected?

6 + 6 = 12

9.(a) How can better RF spectrum utilisation can be achieved? Explain.

(b) Write short notes on:
i) New application areas in Ad hoc network
ii) RAS for reduction in power consumption of network nodes.

4 + (4 + 4) = 12