

M.TECH/ECE/3RD SEM/ECEN 6132/2017
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 alternative for the following: **10 × 1 = 10**

- (i) The family of standard originally developed for wireless environment is
(a) IEEE 801 (b) IEEE 802
(c) IEEE 803 (d) IEEE 804.
- (ii) Which wireless communications technology is used in retail operations in a shopping mall to identify and secure merchandise?
(a) RFID (b) Micro sensor
(c) UNII (d) ISM.
- (iii) Congestion avoidance in wireless networks can be achieved through
(a) TCP protocol (b) Routing protocol
(c) dynamic source routing (d) link reversal routing.
- (iv) The first Cellular phone to include General Access Network is
(a) NOKIA 6136 UMA (b) NOKIA 6131 NFC
(c) NOKIA 6231 UMA (d) None of these.
- (v) Mobile stations do not sense the medium during:
(a) SIFS (b) RTS
(c) NPV (d) CTS.

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- (vi) Sources are said to be of primary type if they have the following:
(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) In Ad hoc networks, nodes are
(a) not familiar with the topology (b) unable to check bit rate
(c) unable to act proactive (d) none of these.
- (ix) In DSDV routing table, the 'sequence number' = ∞ indicates:
(a) an updated sequence (b) the old sequence
(c) a new node (d) the route is broken.
- (x) Robust IT connectivity is an essential feature of
(a) IEEE 802.11 (b) secured network
(c) smart city (d) none of these.

Group - B

2. (a) Compare two wireless networks - one with infrastructure and the second without infrastructure. Discuss briefly three issues related to Ad Hoc wireless networks.
(b) Explain the concept of exposed and hidden terminals in an Ad Hoc wireless network. Show with suitable diagram that hidden terminals can cause serious interference problem. How does receiver initiated MAC protocols improve the situation? Explain.
(2 + 3) + 4 + (3 + 3 + 1) = 12
3. (a) Briefly discuss the major security threats that exist in ad hoc wireless networks.
(b) Illustrate the process of route establishment and route maintenance in Destination Sequenced Distance - Vector Routing Protocol (DSDV) using a suitable example.
4 + 8 = 12

Group - C

4. (a) What is 'desensitization' of a radio receiver? In which stage does it occur? Show mathematically how this phenomenon may occur in a micro-controller based radio receiver.
- (b) In a multi-channel radio receiver, the SINAD for channel 1 is 18 dB at the given RF input signal strength. For the same RF input, the SINAD for channel 2 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 2. Explain the operation of the circuit.

$$(1 + 1 + 4) + 6 = 12$$

5. (a) How does packet transfer take place using the MAC protocol MACA-BI? Explain with a suitable diagram. Elucidate the differences between MACA and MARCH protocols with the help of handshake mechanism diagrams. Hence, show that MARCH takes less time to execute.
- (b) Define the RAS approach for power saving in nodes. Show the schematic diagram for a circuit using RAS solution.

$$7 + 5 = 12$$

Group - D

6. (a) Explain location sensing and acquisition techniques in wireless networks.
- (b) What are the salient features of Generic Access Network and highlight its advantages in spectrum utilisation.

$$6 + 6 = 12$$

7. (a) Define primary and secondary radio units. What is the importance of localization of primary units by the secondary units in underlay networks? Give an idea as to how the process of localization can be implemented.

- (b) What are the main challenges in providing security in Ad Hoc wireless networks? Describe at least four. Explain Denial-of-service attack and Jamming attack in Ad Hoc wireless networks.

$$(2 + 4) + (3 + 3) = 12$$

Group - E

8. (a) What are the various schemes to increase the lifetime of nodes in a wireless ad hoc network?
- (b) How do you define a wireless sensor network? What are the protocols that are commonly used?

$$6 + (3 + 3) = 12$$

9. (a) What are the differences between flooding and gossiping? What is rumor routing?
- (b) What is PEGASIS? Describe the goals and explain this using an example.

$$(4 + 3) + 5 = 12$$