

M.TECH/ECE/3RD SEM/ECEN 6132/2016

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) A wireless Ad Hoc network enables devices to join the network
(a) through routers (b) on the fly
(c) using fibre optics cables (d) through queuing.
- (ii) One approach of collision avoidance (CA) is
(a) out-of-band approach (b) RTS/CTS Method
(c) using directional antenna (d) none of these.
- (iii) What WLAN device provides communications management services to wireless workstations?
(a) Access point (b) Antenna
(c) Network adapter (d) Repeater.
- (iv) One of the parameters to assess QoS in a Ad Hoc Network is
(a) Jitter (b) connectivity
(c) network topology (d) none of these.
- (v) Congestion avoidance in wireless networks can be achieved through
(a) TCP protocol (b) Routing protocol
(c) dynamic source routing (d) link reversal routing.
- (vi) 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.
- (vii) Robust IT connectivity is an essential feature of
(a) IEEE 802.11 (b) secured network
(c) smart city (d) none of these.

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- (viii) 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.
- (ix) Flooding has the disadvantage of
(a) Overlap (b) Implosion
(c) Resource blindness (d) All of these.
- (x) Sensor networks are
(a) Address centric (b) Data centric
(c) Location centric (d) None of these.

Group - B

2. (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) with an example.
4 + 8 = 12
3. (a) What is the difference between pro-active and on-demand routing protocols? Give examples of each. Show how the route is established in DSR protocol for an Ad Hoc wireless network consisting of 10 nodes.
(b) What are the functions of 'broadcast identifier' and 'time to live' packets in AODV? Explain.
(3 + 5) + 4 = 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 A is 16 dB at the given RF input signal strength. For the same RF input, the SINAD for channel B is 10 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 B. Explain the operation of the circuit.
(2 + 4) + 6 = 12

5. (a) In multi-hop wireless networks employing TCP, explain the issues related to hidden and exposed terminals.
- (b) In DSR, explain the function of "Route Error" packets.

8 + 4 = 12

Group - D

6. (a) What is meant by holes in RF spectrum? Express mathematically (i) spectrum utilization and (ii) spectrum utilization efficiency. Hence, find out the relationship between the two.
- (b) What are the techniques applied to improve spectrum utilization? Explain how Hot Spots help to reduce RF congestion. Explain how Cognitive radios help to improve spectrum efficiency.

6 + (2 + 2 + 2) = 12

7. (a) What is the importance of localization of primary units by the secondary units in underlay networks? How does RSSI help the process of localization in a radio network?
- (b) What are the four main security requirements of Ad Hoc wireless networks? Explain the differences between Wormhole Attack and Blackhole attack.

(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) Compare and contrast between proactive, reactive and hybrid routing approaches?

6 + 6 = 12

9. (a) What would be the likely features of a smart city in the Indian Context?
- (b) What are the various means to achieve better spectrum utilisation in a wireless network?

6 + 6 = 12