

**WIRELESS AD HOC AND SENSOR NETWORKS
(ECEN 5131)**

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) In wireless LAN, there are many hidden stations so we cannot detect the
(a) Frames (b) Collision (c) Signal (d) Data.
 - (ii) Which of the following is not the requirement of routing function?
(a) Correctness (b) Robustness (c) Delay Time (d) Stability.
 - (iii) Which of the following summation operation is performed on the bits to check an error-detecting code?
(a) Codec (b) Checksum (c) Attenuation (d) Coder-decoder.
 - (iv) MACA-BI is a hand-shake mechanism with
(a) 3 Steps (b) 4 Steps (c) 2 Steps (d) 5 Steps.
 - (v) Which of the following is the first command in a handshake protocol?
(a) CTS (b) RTS (c) ACK (d) None of these.
 - (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) For centralized routing the decision is made by some designated node called
(a) Designated Center (b) Control Center
(c) Network Center (d) Network Control Center.
 - (viii) The transmit power level is controlled to:
(a) reduce interference (b) to save battery
(c) to reduce pollution of data (d) all of these.
 - (ix) RTR – command stands for
(a) Ready to Reject (b) Ready to Reply
(c) Ready to Receive (d) Ready to Repeat.
 - (x) 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.

Group- B

2. (a) Explain the concept of exposed and hidden terminals in Ad Hoc networks. Show how hidden terminals create serious interference problem with the help of suitable diagram. [[CO2](Understand/IOCQ)]
- (b) How does MACAW protocol improve the synchronization in wireless networks with respect to MACA protocol? Explain clearly the additional features like MILD. How does packet transfer take place using MACAW protocol? Explain with a suitable diagram. [[CO2](Analyze/IOCQ)]
4 + 8 = 12
3. Why does DSR protocol not require beacon? Show how a route is established using DSR protocol for an Ad Hoc wireless network. The network consists of 12 nodes. Explain whenever necessary. What is the function of 'Route Reply' and 'Route Error' packets in DSR? Explain clearly. [[CO5](Apply/HOCQ)]
(2 + 8 + 2) = 12

Group - C

4. (a) Analyse the design challenges associated with the Ad Hoc routing protocols. [[CO2,CO3](Analyze/IOCQ)]
- (b) State the working scheme of AODV routing protocols with neat diagram. [[CO3,CO4](Remember/LOCQ)]
5 + 7 = 12
5. (a) Why is battery power saving critical for Ad Hoc networks? Can the clock shape influence power consumption in a controller? Explain with graphs. [[CO2](Analyze/IOCQ)]
- (b) Define a 'critical' node in respect of MANETS. Show how the life of such nodes can be lengthened with the help of RAS approach. [[CO4](Remember/LOCQ)]
6 + 6 = 12

Group - D

6. (a) What are the four main security requirements of Ad Hoc wireless networks? Explain the Primary User Emulation attack. [[CO1,CO5](Understand/LOCQ)]
- (b) Why is power aware routing important for Ad Hoc networks? What are the classifications for power aware routing in Ad Hoc wireless networks? [[CO3](Analyze/IOCQ)]
(3 + 3) + (3 + 3) = 12
7. (a) What is meant by non-collaborative localization of a primary radio source? What is RSSI? In which circuit is it available in a radio? How does RSSI help the process of localization in a radio network? [[CO4](Analyze/HOCQ)]
- (b) What are the four main security requirements of Ad Hoc wireless networks? Explain the integrity and non-repudiation features. [[CO6](Understand/IOCQ)]
5 + 7 = 12

Group - E

8. What are the differences between ad hoc and sensor wireless networks? Describe some of the challenges of a well-designed sensor network. What are the types of MAC protocols used in sensor networks? Describe their operations.

[[CO2](Remember/LOCQ)]

(2 + 3 + 3 + 4) = 12

9. What are the weaknesses of flooding? What is gossiping? What is rumour (or rumor) routing? What is SPIN protocol? How does it work? What are the advantages?

[[CO4](Understand/LOCQ)]

(2 × 6) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	44.79	37.5	17.71

Course Outcome (CO):

1. Students will develop the ability to apply knowledge of mathematics, science and engineering in the areas of communication engineering.
2. They will be able to analyze a situation and interpret a data in ad hoc networks.
3. Students will acquire knowledge to learn and apply modeling based approach through the extensive use of simulator tools.
4. Students will be able to understand and develop ability to participate in research work.
5. They will be able to apply suitable algorithm for a route.
6. The students will understand the security requirements for networks.

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

