WIRELESS AD HOC AND SENSOR NETWORKS
(ECEN 5131)

Time Allotted : 2½ hrs   **Full Marks : 60**

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
<u>any 4 (four)</u> from Group B to E, taking <u>one</u> from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Consider the following statements.
   I. Multi-mode optical fibres are used for long-distance communication links
   II. Single-mode optical fibres are used for most communication links longer than 500 metres.
Which of the statements given above is/are correct?
(a) Only I   (b) Only II
(c) Both I & II   (d) Neither I nor II.

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

(iii) In wireless ad-hoc network, which of the following is true?
(a) Access point is not required   (b) Access point is must
(c) Nodes are not required   (d) All nodes are access points.

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

(v) A wireless network interface controller can work in _____.
(a) Infrastructure mode   (b) Ad-hoc mode
(c) Both infrastructure mode and ad-hoc mode   (d) WDS mode

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

(vii) In wireless network an extended service set is a set of _____.
(a) Connected basic service sets   (b) All stations
(c) All access points   (d) Connected access points

(viii) Which of the following is the 802.11 High Rate Standard?
  (a) IEEE 802.15   (b) IEEE 802.15.4
  (c) IEEE 802.11g   (d) IEEE 802.11b.

(ix) Mobile stations do not sense the medium during
  (a) SIFS   (b) RTS   (c) NPV   (d) CTS

(x) AODV protocol is based on
  (a) DSDV   (b) DSR   (c) MACAW   (d) None of these.

Fill in the blanks with the correct word

(xi) Multichannel Protocols are example for _____.

(xii) IEEE802.11 defines the basic service set as the building block of a wireless _____.

(xiii) _____ & _____ are the two channels are responsible for initiating mobile calls.

(xiv) _____ is a CDMA standard of second generation.

(xv) One benefit of Ad Hoc network is _____.

Group - B

2. (a) State the differences between Static and Mobile Ad Hoc Network.
                 [(CO1)(Remember/LOCQ)]
 (b) How many types of contention based protocols are there? What is the difference between them?   *[(CO1,CO2)(Understand/LOCQ)]*
 (c) Explain IEEE 802.11 in Ad Hoc Mode.   *[(CO1)(Apply/IOCQ)]*
                  3 + 5 + 4 = 12

3. (a) Reflect on the differences between the different contention based protocols. Explain Static and Mobile Ad Hoc networks.   *[(CO2)(Apply/IOCQ)]*
 (b) Draw and explain MAC protocol with a neat diagram. *[(CO1)(Remember/LOCQ)]*
              (3 + 3) + (4 + 2) = 12

Group - C

4. (a) Explain Hybrid Coordination function.   *[(CO3)(Remember/LOCQ)]*
 (b) Evaluate how degradation of receiver sensitivity can impact the QoS in MANETs?   *[(CO3) (Evaluate/HOCQ)]*
 (c) Evaluate what are the issues and challenges in providing QOS in Ad Hoc Wireless Networks.   *[(CO3)(Evaluate/HOCQ)]*
                  4 + 4 + 4 = 12

5. (a) Define a 'critical' node in respect of MANETS. Show how the life of such nodes can be lengthened with a help of a suitable circuit. Explain the circuit operation.
            [(CO3)(Remember/LOCQ)(Apply/IOCQ)]
 (b) Explain RAS approach for power saving in nodes. Show the schematic diagram for a circuit using RAS solution. *[(CO3)(Analyse/IOCQ)] [(CO3)(Understand/IOCQ)]*
              (2 + 4) + (2 + 4) = 12

Group - D

6. (a) Discuss Location acquisition technique and location sensing techniques.
   [(CO4) (Understand/LOCQ)]
   (b) Discuss the techniques applied to improve spectrum utilization.
   [(CO4)(Analyse/IOCQ)]
   (3 + 3) + 6 = 12

7. (a) How does an Ad Hoc network avoid network security attacks?
   [(CO5)(Evaluate/HOCQ)]
   (b) What are the types of wireless Network security threats? Name two types of attacks, with brief explanation. *[(CO5)(Analyse/IOCQ)]*
   (c) Battery power management is necessary for efficient network operation. Justify.
   [(CO5)(Evaluate/HOCQ)]
   4 + 4 + 4 = 12

Group - E

8. (a) Identify the differences between ad hoc and sensor wireless networks? Mention the importance of distributed processing and battery conservation for a well-designed sensor network. *[(CO6)(Analyse/IOCQ)(Evaluate/HOCQ)]*
   (b) Explain the importance of clustered architecture for sensor networks. How is the cluster-head selected? *[(CO6)(Analyse/IOCQ)]*
   (3 + 3) + 6 = 12

9. (a) Draw and explain the WLAN architecture. *[(CO5)(Analyse/IOCQ)]*
   (b) Evaluate the need of WSN in healthcare monitoring, environmental sensing, and industrial monitoring. *[(CO5) (Evaluate/HOCQ)]*
   6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	27.08	43.75	29.17

Course Outcome (CO):

After the completion of the course students will be able to
CO1. Understand the under lying technologies of wireless networks.
CO2. Analyze the various design issues and challenges of Ad hoc (wireless) Networks.
CO3. Learn different routing protocols and their working.
CO4. Learn and analyze end to end transmission schemes.
CO5. Understand network design strategies and QoS.
CO6. Understand sensor networking.

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