AD-HOC WIRELESS NETWORKS
(ECEN 4127)

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

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one 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) MAC layer belongs to _____ layer of the ISO/OSI protocol from the bottom
(a) first (b) second (c) third (d) fourth

(ii) The two sub layers of data link layers are
(a) LLC and MAC (b) LLC and Transport
(c) Physical and MAC (d) MAC and Session

(iii) Ad-hoc Wireless Networks are
(a) Infrastructure less network (b) Fixed Infrastructure network
(c) Both (a) and (b) (d) None of the above.

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

(v) What is DVMRP?
(a) Distance vector multicast routing protocol
(b) Distributed vector multicast routing protocol
(c) Defined vector multicast routing protocol
(d) Distinct vector multicast routing protocol

(vi) Which of the following is NOT an objective of a transport layer protocol?
(a) End-to-end delivery of data packets (b) Flow control
(c) Congestion control (d) Routing table maintenance

(vii) In ad-hoc wireless networks, traffic from neighboring links that affects throughput is known as:
(a) Cross traffic (b) Induced traffic
(c) Hidden traffic (d) Congested traffic

(viii) ATCP maintains compatibility with traditional TCP by implementing itself as:
(a) A modified version of the MAC layer. (b) A routing protocol.
(c) A thin layer between IP and TCP (d) An extension of the application layer.

(ix) Processor power management scheme falls directly under
(a) Battery management (b) Transmission power management
(c) System power management (d) Control power management

(x) In CDMA-based ad-hoc systems, transmission power management is essential to maintain
(a) Signal-to-noise ratio (SNR) (b) Signal-to-interference ratio (SIR)
(c) Bit error rate (BER) (d) Frame error rate (FER)

Fill in the blanks with the correct word

(xi) MACA-BI is a hand-shake mechanism with _____ steps.

(xii) Mobile stations do not sense the medium during _____ stage.

(xiii) Protocols belonging to Geographical information assisted routing improve the performance of routing and _____.

(xiv) Sensor networks are _____ centric.

(xv) The full form of VANET is _____.

Group - B

2. (a) Why is CSMA/CD protocol not preferred for wireless ad-hoc networks? *[(CO2, CO4)(Analyse/IOCQ)]*

(b) What are the criteria for designing wireless sensor network? How does it differ from Adhoc wireless network? *[(CO1, CO2)(Remember/LOCQ)]*

(c) Describe hidden terminal problem and exposed terminal problem. How to alleviate the hidden terminal problem in MAC layer? Describe any common measure. *[(CO2)(Evaluate/HOCQ)]*

4 + 4 + 4 = 12

3. (a) Design the network architecture for hybrid ad-hoc network for mobile nodes. *[(CO1, CO2)(Remember/LOCQ)]*

(b) How MACA avoids the hidden and exposed terminal problem? Explain with diagrams. *[(CO1, CO2)(Apply/IOCQ)]*

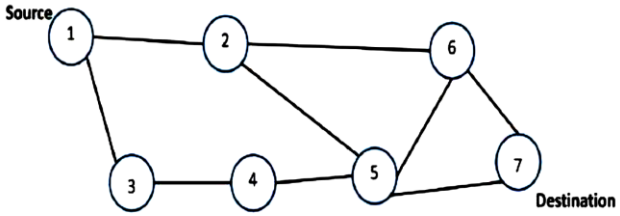
(c) How does packet transfer take place using MACA-BI protocol? Explain with a suitable diagram. *[(CO1, CO2)(Analyse/IOCQ)]*

4 + 4 + 4 = 12

Group - C

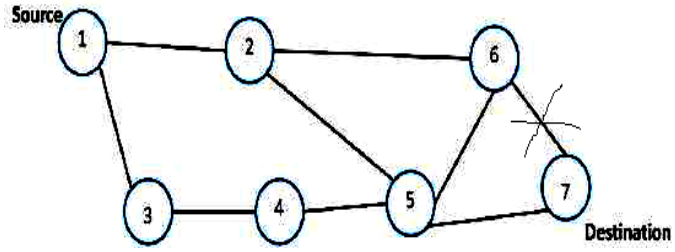
4. (a) How is the loop free property ensured in on demand routing protocol with the help of a suitable network model**.** *[(CO2, CO3)(Analyse/IOCQ)]*

(b) In the ad-hoc communication network below using DSDV (Destination Sequenced Distance Vector Protocol), with Node 1 as source, and Node 7 as destination, find the routing table for Node 1, with the destination id field, next node id, and the distance information.



[(CO3)(Create/HOCQ)]

(c) With node re-arrangement if the communication link between nodes 6 and 7 breaks then show the modified routing table for Node 1?



[(CO3)(Create/HOCQ)]

4 + 4 + 4 = 12

5. (a) Draw multi-level clustering network diagram for Hierarchical State Routing Protocol (HSR). *[(CO3)(Understand/LOCQ)]*

(b) How are route establishment and maintenance done in DSDV? Show the network topology with at least 15 nodes. *[(CO3)(Evaluate/HOCQ)]*

(c) Explain with suitable network diagram Multicast Zone Routing Protocol (MZRP). *[(CO3)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Group - D

6. (a) Explain the major objectives of a transport layer protocol. *[(CO2, CO6)(Understand/LOCQ)]*

(b) Differentiate between UDP and TCP in terms of reliability and connection type. *[(CO2, CO6)(Remember/LOCQ)]*

(c) Why are traditional TCP protocols not suitable for ad-hoc wireless networks? *[(CO2, CO6)(Analyse /IOCQ)]*

4 + 4 + 4 = 12

7. (a) Define induced traffic in ad-hoc networks. What is induced throughput unfairness? *[(CO2, CO6)(Understand/LOCQ)]*

(b) What is the effect of frequent path breaks on TCP layer of ad-hoc wireless network? *[(CO2, CO6)(Analyse /IOCQ)]*

(c) Explain how packet loss is misinterpreted as congestion in TCP*?* *[(CO2, CO6)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Group - E

8. (a) What are some design choices for providing QoS support in ad-hoc wireless networks? *[(CO5)(Apply/IOCQ)]*

(b) Explain how power control improves energy efficiency in ad-hoc networks. *[(CO5)(Analyse/IOCQ)]*

(c) Discuss stateful versus stateless approaches in QoS provisioning. *[(CO5)(Remember/LOCQ)]*

4 + 4 + 4 = 12

9. (a) Differentiate between soft real-time and hard real-time applications with examples. *[(CO5)(Remember/LOCQ)]*

(b) Define access delay and explain its role in QoS measurement. *[(CO5)(Understand/LOCQ)]*

(c) What are the challenges of providing QoS in ad-hoc networks? Discuss how energy management and QoS are interrelated. *[(CO5)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	37.5	45.83	16.67