

**WIRELESS AND MOBILE COMPUTING
(INFO 3242)**

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) Which of the following is an on-demand routing protocol for MANETS?

(a) DSR	(b) DSDV
(c) AODV	(d) all of these.
 - (ii) Multiplexing involves

(a) one path and one channel	(b) multiple paths and one channel
(c) multiple paths and multiple channels	(d) one path and multiple channels.
 - (iii) In wireless LAN, there are many hidden stations, so we cannot detect the

(a) frames	(b) collision
(c) signal	(d) data.
 - (iv) The maximum output transmit power level in Bluetooth networks is

(a) 1 W	(b) 100 mW
(c) 2.5 mW	(d) 1 mW.
 - (v) Commonly used mode for 3G networks is

(a) TDMA	(b) FDMA
(c) TDD	(d) FDD.
 - (vi) The network topology that supports bi-directional links between each possible node is

(a) Ring	(b) Star	(c) Tree	(d) Mesh.
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 - (vii) What is WPA?

(a) Wi-fi Protected Access	(b) Wired Protected Access
(c) Wired Process Access	(d) Wi-Fi Process Access.

- (viii) Which topology requires a central controller or hub?

(a) Mesh topology	(b) Star topology
(c) Bus topology	(d) Ring topology.
- (ix) MACAW, the MAC protocol for wireless ad hoc networks uses a control packet, called DS. It consists of

(a) 30 bytes	(b) 3 bytes
(c) 300 bytes	(d) 3 Kbytes.
- (x) In DSDV routing table, the 'sequence number' = odd indicates

(a) an updated sequence	(b) the old sequence
(c) a new node	(d) none of these.

Group - B

2. (a) (i) A cable TV system has 100 commercial channels, all of them alternating programs with advertising. Is this more like TDM or FDM? Explain with suitable reasons.
(ii) Distinguish between a router and a gateway.
- (b) (i) Calculate the maximum achievable data rate over a 9 KHz channel whose signal to noise ratio is 20 dB.
(ii) What is quantization error with respect to pulse code modulation?
(4 + 2) + (4 + 2) = 12
3. (a) Distinguish between the various analog and digital modulation schemes.
- (b) If a transmitter produces 50W of power, express the power in dBm and dBW.
If 50W is applied to an unity gain antenna, determine the received power, in dBm, at a distance of 100m from the transmitting antenna. The carrier frequency is 900 MHz. Assume the gain of the receiving antenna to be unity.

6 + 6 = 12

Group - C

4. (a) Explain how FHSS principle is applied in Bluetooth technology. What are piconet and scatternet? Explain their operation.
- (b) Explain, in brief, the protocol architecture of IEEE 802.11.

(2 + 4) + 6 = 12

5. (a) Mention four scenarios where wireless networks can replace wired networks in order to improve the efficiency of people at their workplace. Briefly describe how in each case a wireless network will fit the role better than a wired network.
- (b) Deduce the maximum number of subscribers in a GSM system when reuse factor is 10. Why is the uplink frequency lower than the downlink frequency in GSM systems? Explain.

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

Group - D

6. (a) How does packet transfer take place using MACA-BI protocol? Explain with a suitable diagram.
Elucidate the differences between MACA and MACAW protocols with the help of handshake mechanism diagrams.
- (b) (i) What role does the routing protocol play in the provisioning of QoS guarantees for ad hoc wireless networks?
(ii) Explain the features of Scalability in wireless networks.

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

7. (a) Explain GPRS architecture with suitable diagram and the role of its components.
- (b) 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.

$$6 + (2 + 4) = 12$$

Group - E

8. (a) (i) What are the major components of a sensor node?
(ii) Distinguish between the SPIN and GPSR methods of data dissemination in wireless sensor networks.
- (b) (i) What is meant by Coverage and Connectivity in sensor networks?
(ii) Distinguish between the SET UP phase and STEADY phase in LEACH protocol for wireless sensor networks.

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

9. (a) What is UWB communications? Explain the operation with the help of a block diagram.

- (b) (i) Explain how eavesdropping can contribute to the vulnerability of Wi - Fi systems.
- (ii) What are the major factors to be considered while selecting a light source for designing a mobile network using optical wireless technology?

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