

B.Tech 8th Semester Exam., 2022

(New Course)

AD-HOC AND SENSOR NETWORKS

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : 2×7=14

- (a) What is wireless communication?
 - (i) Sending data from one location to another with the use of physical medium
 - (ii) Sending data from one location to another without the use of physical medium
 - (iii) Sending data from one location to another without the use of virtual medium
 - (iv) None of the above

(b) _____ is a transmission method used in MIMO wireless communications to transmit encoded data signals independently.

(i) MU-MIMO

(ii) STTD

(iii) SM

(iv) Collaborative Uplink MIMO

(c) Which of the following is not a fast fading propagation mechanism?

(i) Reflection

(ii) Diffraction

(iii) Refraction

(iv) Scattering

(d) Wormhole attack

(i) receives packets at one location in the network

(ii) creates routing loops

(iii) selectively dropping packets

(iv) may leak confidential information to unauthorized users

- (e) In MACA-BI, the receiver node initiates data transmission by transmitting
- (i) RTS control packet
 - (ii) CTS control packet
 - (iii) RTR control packet
 - (iv) ACK control packet
- (f) On demand routing protocols exchange routing information periodically.
- (i) Yes
 - (ii) No
- (g) 802.11 wireless networking uses what method as the media access method?
- (i) CSMA/CD
 - (ii) CTS/RTS
 - (iii) CSMA/CA
 - (iv) CSCD/CA
- (h) Repudiation refers to
- (i) attempted denial by a node involved in a communication
 - (ii) selection of node involved in a communication
 - (iii) selectively dropping packets
 - (iv) disrupt the normal operation of the network

- (i) In which type of attack, an adversary attempt to prevent consume/waste away resources of other nodes present in the network?
- (i) Resource consumption attack
 - (ii) Blackhole attack
 - (iii) Denial of service attack
 - (iv) Wormhole attack
- (j) In wireless ad-hoc network
- (i) access point is must
 - (ii) access point is not required
 - (iii) nodes are not required
 - (iv) all nodes are access points
2. (a) Which modulation mechanism is better, amplitude modulation or frequency modulation? Give reasons to support your answer. Explain the advantages and disadvantages of the quadrature amplitude modulation schemes. 7
- (b) Discuss the deployment scenarios for various HIPERLAN standards in the ETSIBRAN system. 7
3. (a) How do you separate different layers (macro, micro and pico) of a cellular network in order to avoid co-channel interference across layers? 7

- (b) How does frequency reuse enhance cellular network capacity? Consider an area of 1000 sq. km to be covered by a cellular network. If each user requires 25 kHz for communication, and the total available spectrum is 50 MHz, how many users can be supported without frequency reuse? If cells of area 50 sq. km are used, how many users can be supported with cluster sizes of 3, 4 and 7? Besides the number of users, what other major factor influences the decision on cluster size? 7
4. (a) How does the value of reuse factor (k) influence the performance of MCNs? Calculate the value of reuse factor (k) required for an average neighbour density of 6. The number of nodes in the cell is 100 and the cell radius (R) is 500 meters. 7
- (b) What is the output of the first round of the DES algorithm when the plaintext and the key are both all ones? 7
5. (a) Discuss the pros and cons of increasing the mobility margin in the power control scheme for hybrid wireless networks. In the power control scheme for hybrid wireless networks, what are the two important factors that should be considered to decide the value of the mobility margin? 7

- (b) Calculate the duty cycle and average power to peak power ratio of a UWB system in which the monocycle duration is 0.5 ns, pulse repetition interval is 25 ns and pulse amplitude is 0.1 mW. 7
6. (a) Wireless optical WDM rings provide high data rate networks in metropolitan areas. Discuss the possible solutions and factors to be considered for providing reliability for a wireless optical WDM ring network. 7
- (b) Discuss the effects of increasing the control zone radius in Meghadoot architecture in terms of the resource requirements at the IN and the routing efficiency. 7
7. Write short notes on the following : 14
- (a) Wireless Sensor Networks (WSNs)
- (b) Transport layer protocol for ad-hoc networks
- (c) Preferred Destination-Ring Routing Scheme (PDRS)
- (d) SPINS

8. Write short notes on the following : 14
- (a) Mobile ad-hoc Networks (MANETS)
 - (b) QoS-enabled AODV
 - (c) TCP over ad-hoc wireless Networks
 - (d) Software-based anti-tamper techniques
9. (a) Consider the third iteration of LEACH protocol, if the desired number of nodes per cluster is ten. What is the threshold calculated for a node during its random number generation? 7
- (b) Why are public key cryptographic solutions not suitable for the security of sensor networks? 7
