

2024

COMPUTER SCIENCE AND ENGINEERING

Paper : CSCL-1001

(Wireless and Mobile Computing)

Full Marks : 70

*The figures in the margin indicate full marks.*

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

Answer *question nos. 1, 2* and *any four* from the rest.

1. Answer *any five* questions :

2×5

- (a) How does M-TCP solve the problem of frequent disconnections?
- (b) Why do we use reverse tunneling in Mobile IPv6?
- (c) What is the justification for using hexagonal cells in cellular networks?
- (d) State the causes for generating 'immediate advertisement' in DSDV. Why is it not periodic?
- (e) Is there a chance of collision between route request packets in DSR? If yes, how can it be avoided?
- (f) Does an ad hoc network suffer any disadvantage for lacking infrastructure compared to a cellular network?
- (g) Distinguish between the Push-based and Pull-based data forwarding approach in a sensor network.

2. Answer *any five* questions :

4×5

- (a) How does T-TCP perform well for a series of short HTTP request and reply messages?
- (b) Explain the Authentication Process used in the GSM network.
- (c) Explain the GSM-900 frame hierarchy. Which TDMA frames of TCH-F are used to communicate signal strengths?
- (d) Discuss the performance of DSDV with DSR with respect to overheads and End-to-End delay with necessary justifications.
- (e) What motivates creating a zone in ZRP instead of using a flat network? What would the situation be if the destination was not within the zone?
- (f) Can a Link state routing strategy perform effectively in a Mobile Adhoc network? Justify your answer.
- (g) Illustrate the role of Destination Sequence no. in DSDV through an example.

Please Turn Over

3. (a) Explain how to improve wireless system capacity by reusing frequencies.  
 (b) Derive the expression of the co-channel interference due to frequency reuse in terms of signal-to-noise ratio.  
 (c) A GSM network uses uplink frequencies of 800MHz-840MHz and downlink frequencies of 850MHz-890MHz. It uses a guard band of 25kHz. It also uses a TDMA with 8 time slots and each channel has BW100kHz. Determine the number of physical channels available in this GSM system.

3+4+3

4. (a) Discuss multipath propagation of wireless signals in an indoor environment.  
 (b) Using Taylor's Expansion, derive a 2-ray path loss model.  
 (c) How can you fit this into the following simplified path loss model?

$$P_r = P_t K \left[ \frac{d_r}{d} \right]^\gamma, 2 \leq \gamma \leq 8.$$

3+5+2

5. (a) Discuss the various tables and their attributes used in Home Agent and Foreign Agent in Mobile IPv4.  
 (b) How does a packet from a correspondent node tunnel to the mobile node currently visiting a foreign network?  
 (c) What is the use of the Identification field of the Registration Request message?
6. (a) "MACA partially solves the hidden station problem." — Comment with justification.  
 (b) Describe the contributions of MACA-W over MACA with a necessary illustration.  
 (c) Is MACA-W able to address the exposed station problem? Explain your answer.
7. (a) How can the performance of a reactive protocol (say DSR) be improved using location information?  
 (b) Discuss the topology information management process in OLSR.  
 (c) How can the packet generation be minimized within the route discovery phase in DSR?
8. (a) State the importance of network lifetime in the context of a routing protocol in WSN.  
 (b) Describe the cluster head selection process in LEACH. Justify the motivation behind such selection.  
 (c) Discuss the basic principle of data transfer in TORA. For what type of network it performs better than the others?

4+3+3

3+5+2

4+3+3

2+5+3