

M. Tech Semester – (Mid-Semester) Examination, 2024

Subject: Computer Science

Paper Code & Name: CSCL 1001 (Wireless and Mobile Computing)

Full Marks: 30

Date: 21.05.2024

Time and Duration: 12.00 PM – 1:30 PM

Answer question no 1 and any three from the rest

[5 x 3]

✓ 1. Answer any five questions.

- a) "CSMA/CD can't be applied in the MAC layer of wireless communication" – critically comment on the statement, describing the issues with proper examples.
- b) Suppose 16 wireless devices are connected in a grid numbered (1,1) to (4,4). Determine the hidden nodes and exposed nodes if the node (2,2) wants to send data to node (2,3).
- c) Determine the length of the Aluminium plate needed to generate a wireless signal of frequency 98MHz using a Half-wave dipole antenna.
- d) Describe the leaky bucket algorithm to run the isochronous (time-dependent) application for intermittent communication systems.
- e) With a suitable diagram, describe the multipath propagation of wireless signals in an indoor environment.
- f) What is the architectural difference between ad-hoc network and wireless LAN?

2. CSMA/CA uses a random backoff algorithm during communication which creates problem to run the isochronous (time-dependent) application over wireless communication. How is this problem solved in wireless LAN? Describe the solution in detail. 5

✓ 3. State and derive the Two-Ray Path Loss model. 5

4. State two different techniques to detect congestion in TCP. How does TCP control the congestion in these two cases? Consider the effect of using slow start on a line with a 10 msec RTT and no congestion. The receiver window is 24 KB and the maximum segment size is 2 KB. How long does it take before the first full window can be sent? [1+2+2]

5. "I-TCP solves the last mile delivery problem at the cost of reliability and security" – critically comment on the statement. How is the reliability issue solved in S-TCP? Suppose in S-TCP the snoop_data() module receives a duplicate packet from the fixed host whose sequence number is less than the sequence number of the last packet acknowledged by the mobile host. Determine why does the fixed host send the duplicate packet. [2+2+1]

M.Tech 2nd Semester Examination 2024
Subject: Wireless and Mobile Computing

Full Marks: 30

Duration: 1½ hour

1. Answer any five of the following questions.

[5x2=10]

- a. State Friis Free space Path Loss model and Two-Ray Path Loss model.
- b. Determine the length of a dipole antenna to generate a carrier signal of 98 MHz.
- c. What are the factors that affect the performance of TCP in wireless and mobile environments?
- d. "IPv6 provides more features compared to IPv4 in handling mobility with MobileIP" - Justify this statement by citing any two features of IPv6 to support mobility.
- e. Does an ad hoc network suffer any disadvantage for not having infrastructure when compared to a cellular network?
- f. What do you mean by "On-demand routing"?
- g. "Link State routing becomes impractical for a large network" - Comment.

2. Answer any four of the following questions.

[4x5=20]

- a. What is the role of Mobile IP in mobile computing? Explain how it addresses the challenges of mobility.
- b. Differentiate the approaches of handling the socket and buffer migration by I-TCP and S-TCP in case of Node migration.
- c. What do you mean by orthogonal codes? How does CDMA use orthogonal codes to communicate using the same frequency simultaneously? Illustrate with an example.
- d. Describe the route optimization process as used in DSR through an example.
- e. Discuss, with necessary justification, the relative performance(s) of DSDV and DSR in terms of End-to-End delay, Power consumption and packet delivery in high mobility.
- f. Illustrate through an example the inherent problem of "looping" in context of Distance Vector routing. Discuss the role of Destination Sequence Number in DSDV in this context.