

Nirma University

Institute of Technology

Semester End Examination (IR) / Supplementary Examination, May - 2022

B. Tech. in Computer Science and Engineering, Semester-V

2CS502 Computer Networks

Time: 2 Hours

Max. Marks: 50

Instructions:

1. Attempt all questions.
2. Figures to the right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable data wherever necessary and specify them.
5. **Sub-questions of each of the three questions must be written together.**

Q.1 Do as Directed. [18]

- A)** Frames of 1000 bits are sent over a 1-Mbps channel using a geostationary satellite whose propagation time from the earth is 270 msec. Acknowledgements are always piggybacked onto data frames. The headers are very short. Three-bit sequence numbers are used. What is the maximum achievable channel utilization for
- I. Stop-and-wait.
 - II. Go Back N.
 - III. Selective Repeat.

OR

- A)** Compute the fraction of the bandwidth that is wasted on overhead (headers and retransmissions) for selective repeat sliding window protocol on a heavily-loaded 50-kbps satellite channel with data frames consisting of 40 header and 3960 data bits. Assume that the signal propagation time from the earth to the satellite is 270 msec. ACK frames never occur. NAK frames are 40 bits. The error rate for data frames is 1 percent, and the error rate for NAK frames is negligible. The sequence numbers are 8 bits. **(6)**
- B)** How does bandwidth and latency influence the performance of a client-server system? Give an example of a network that exhibits high bandwidth and high latency. Also, give an example of a network with low bandwidth and low latency. **(4)**
- C)** Differentiate between connection oriented and connection less service at network layer. **(4)**
- D)** An upper-layer packet is split into 10 frames, each of which has an 80 percent chance of arriving undamaged. If no error control is done by the data link protocol, how many times must the message be sent on average to get the entire thing through? **(4)**

Q.2 [16]

- A)** Explain establishment of virtual circuit between a sender and a receiver with an appropriate example. Why Virtual Circuit Identifier (VCI) for single virtual circuit may be different at different routers? **(6)**
- B)** An ISP is granted a block of addresses starting with 120.80.0.0/16. The ISP wants to distribute these addresses to **(6)**

- I. Group A requiring 64 addresses
- II. Group B requiring 16 addresses
- III. Group C requiring 8 addresses

Design the sub-blocks and give the slash notation for each sub-block.
Find out how many addresses are still available after allocation.

OR

- B)** TCP considers loss of a packet as a congestion signal (True/False)? Justify. How does TCP help the network layer to mitigate the congestion? **(6)**
 - C)** Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one is less? Explain your answer. **(4)**
- Q.3** **[16]**
- A)** What is a forbidden region for a transport layer protocol? Which are the two scenarios in which senders can enter the forbidden region? Explain with diagrams. **(6)**
 - B)** Explain the working of iterative and recursive DNS query request/response with appropriate examples. **(6)**
 - C)** A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation speed of 200 m/ μ sec. Repeaters are not allowed in this system. Data frames are 256 bits long, including 32 bits of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel in order to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming that there are no collisions? **(4)**