

Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. (CST) 6th Semester Mid-Semester Examination, April 2021
Subject: Computer Networks (CS - 602)

Time: 45 minutes

Full Marks: 30

Answer all Questions
(Write all parts of the same question together)

1. Answer the following (in brief): [20 marks]
 - i) The topology with highest reliability is: (a) bus (b) star (c) ring (d) mesh [1]
 - ii) End-to-end connectivity is provided in: (a) the network layer (b) the transport layer (c) the session layer (d) it is a combined functionality of the network and the data link layer [1]
 - iii) Pick the correct statement(s): (a) In connection-oriented service, the destination address is to be specified only during the setup. (b) Initial setup is not possible in connectionless service. (c) Packet sequencing is not guaranteed in connection-oriented service. (d) Initial setup is required in connectionless service. [2]
 - iv) For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology? [2]
 - v) In a LAN with a link-layer switch, host A wants to send a message to host B . Since communication is through the link-layer switch, does the switch need to have an address? Explain. [2]
 - vi) How many point-to-point WANs are needed to connect n LANs if each LAN should be able to directly communicate with any other LAN? [1]
 - vii) A _____ is a device that forwards packets between networks by processing the information included in the packet. [1]
 - viii) Which switching technique makes better utilization of link bandwidth? Does it have any trade-off? [1 + 1]
 - ix) What happens if one station is unplugged in either of a bus and a ring topology? [1 + 1]
 - x) Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? Why? [1 + 1]
 - xi) Why do HTTP, FTP, SMTP, and POP3 run on top of TCP rather than on UDP? [2]
 - xii) Consider congestion control in TCP. When the timer expires at the sender, the value of `ssthresh` is set to one half of its previous value. True or false? Justify. [2]
2.
 - a) Suppose a host `cis.poly.edu` queries its local DNS server to resolve the IP address for the host `gaia.cs.umass.edu`. Schematically show the different steps by which different DNS servers interact to resolve the query iteratively. [3]
 - b) Consider an e-commerce site that wants to keep a purchase record for each of its customers. Diagrammatically show how this can be done with cookies. [2]
3.
 - a) Consider transferring a large file of L bytes from Host A to Host B. Assume an MSS of 536 bytes.
 - i. What is the maximum value of L such that TCP sequence numbers are not exhausted? Recall that the TCP sequence number field has 4 bytes.

- ii. For the L you obtain in (i), find how long it takes to transmit the file. Assume that a total of 66 bytes of transport, network, and data-link header are added to each segment before the resulting packet is sent out over a 155 Mbps link. Ignore flow control and congestion control so A can pump out the segments back-to-back and continuously. [2 + 2]
- b) Draw the different segment exchange process taking place during the establishment of a TCP connection. [1]