National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	**Computer Networks**	**Course Code:**	**CS307**
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	Section:	**-**	**Page(s):**	**-**
	Exam Type:	**Mid1**		

Student Name: **Roll No.** **Section:**

Instruction/Notes: Attempt questions on this paper. You may use rough sheet but it should not be attached to this paper as it will not be marked. Blotting this paper will result in negative marking.

Question 01: Select the correct answer.

1. If the size of the packet is increased, the following delay will be increased
   a. Propagation delay
   b. Transmission delay
   c. None of the above
   d. Both of the above
2. The following is NOT a packet switching delay
   a. Queuing delay
   b. Processing delay
   c. Connection establishment delay
   d. Transmission delay
3. FTP uses the same TCP connection to send control messages and data.
   a. True
   b. False
4. Which of the following access network technology will be disconnected if you get a phone call while using Internet:
   a. FTTH
   b. DSL
   c. Dialup
   d. Cable network
5. In an ideal world scenario, we would like the Internet to
   a. Behave like circuit a switched network but use packet switching
   b. Behave like a packet switched network but use circuit switching
   c. Always use packet switching
   d. Always use circuit switching
6. A traffic intensity of 1 means
   a. Optimal usage of network resources
   b. Infinite delays
   c. Waste of network resources
   d. None of the above
7. Which of the following could be a potential drawback of having layered models for networks
   a. Redundancy of functionalities on different layers
   b. Too many addressing schemes

c. Security implementation on each layer
d. All of the above

8. A UDP packet can be referred to as
   a. Frame
   b. Datagram
   c. Segment
   d. Message
9. The behavior of HEAD method in HTTP is similar to
   a. POST
   b. DELETE
   c. GET
   d. All of the above except that it is used for debugging too
10. If a user wants to download three files simultaneously, there will be _____ number of TCP connections between FTP client and FTP server
    a. 2
    b. 3
    c. 4
    d. 5

Question 02: Consider the network connectivity between Node A and B shown in *figure 1*. Take the following assumptions and solve the questions given below:

***Assume**:*

All links length = 3 Kms, Links transmission capacity = 50 Mbps, propagation speed = 300 meters/microseconds
Processing delay = 0; packet size = 1000 bytes

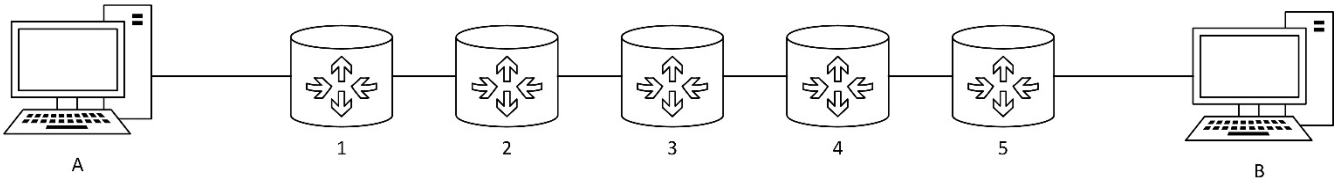

Figure 1

a) Find the total delay from A to B

Transmission delay = (1000 * 8) / 50 Mbps = 160 micro seconds.

Propagation delay = 3000 / 300 miles/microsec = 10 microseconds.

Total delay for one hop = 160 + 10 = 170 microseconds

6 hops = 6 x 170 = 1020 microseconds

b) Suppose that the link between router 2 and 3 has a transmission capacity of 100 Mbps. What will be the end-to-end delay in this case?

5 x 170 = 850
Router 2 to 3 total delay: 1000 * 8 / 100 Mbps = 80 microseconds.

Transmission + propagation delay on link from router 2 to 3 = 80 + 10 microseconds = 90 microseconds
Total delay = 90 microseconds + 850 = 940

c) Suppose three packets are already queued at router 3 when a packet from Node A travelled to router 3. What will be the end-to-end delay? (assume transmission capacity of all links to be the same).

5 x 170 = 850
At Router 3, three packets are ALREADY queued. The queuing delay is introduced equal to the transmission time of FOUR packets. i.e. 1000 * 8 * 4 / 50 Mbps = 640 microseconds. Additionally, propagation delay from router 3 to router 4 is 10 microseconds.

Total delay = 850 + 640 + 10 = 1500 microseconds.

d) What is the maximum number of bits that can be on the link at any given time?

$R.d_{prop}$
$(50 \times 10^{6}) \times (10 \times 10^{-6}) = 500$ bits

Question 03: An Internet user located in Lahore requests a 125 KB web page from a server located in Islamabad. The received page references 5 image files, 250 KB each. User is connected to the Internet via a 10 Mbps access link. Assume that it takes 50 ms for a small HTTP message to travel from client to server (and vice versa). Also assume that user's access link is the connection bottleneck.

a) **What is RTT? Calculate the value of RTT in this above connection**

RTT is the round trip time taken for an HTTP message to reach the server and back.
RTT = (50 ms) x 2 = 100 ms

b) **Calculate the total time taken for the web page (including image files) to display on user's screen if non-persistent HTTP is used with one connection at a time (ignore processing delays)**

Web page: (2 x 100 ms) + (125 x 8 x 1000/10000000) = 300 ms
Image files: 5 x [(2 x 100 ms) + (250 x 8 x 1000/10000000)] = 2000 ms

Total time = 2.3 seconds

c) How long would it take to display the same web page with persistent HTTP (single connection)?

Web page: (2 x 100 ms) + (125 x 8 x 1000/10000000) = 300 ms
Image files: 100 ms + (5 x 250 x 8 x 1000/10000000) = 1100 ms

Total time = 1.4 seconds