National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Computer Networks	Course Code:	CS307
Program:	BS(CS)	Semester:	Fall 2018
Duration:	60 Minutes	Total Marks:	25
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Section:	ALL	Page(s):	4
Exam Type:	Mid-1		

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.

Question 1: Choose the best option for the following MCQs and provide your answer in the below table. Answers outside the table **will not** be considered.

MCQ #	Answer
1.1	
1.2	
1.3	
1.4	
1.5	

1.1 Which of the following statement(s) best describe Packet Switching? [1]

a. Entire packet must be received on the router before transmitting first bit of the packet to the available outbound link
b. First bit of the current router must be forwarded to available outbound link when half of the packet is received
c. Path resources are reserved for the duration of communication
d. Path resources are acquired on demand
e. Both b and c
f. Both a and c

1.2 In the layer hierarchy as the data packet moves from the upper to the lower layers, headers are [1]

a. Added
b. Removed
c. Rearranged
d. Modified

1.3 Which of the following is present in both an HTTP request line and a status line? [1]

a. HTTP version number
b. URL
c. Method
d. None of the mentioned

1.4 How long it takes to send a file of 640,000 bits from Host A to Host B over a circuit-switched network. Suppose that all links in the network use TDM with 24 slots and have a bit rate of 1.536 Mbps. Also suppose that it takes 500 msec to establish an end-to-end circuit before Host A can begin to transmit the file. [3]

a. 10.5 sec
b. 6.4 sec
c. 10 sec
d. None of the above

1.5 If traffic intensity is greater than 1, it means that [1]

a. the average rate at which bits arrive at the queue is less than the rate at which the bits can be transmitted from the queue
b. the queuing delay is within the bound and the network is not congested
c. the average rate at which bits arrive at the queue exceeds the rate at which the bits can be transmitted from the queue
d. The queuing delay is unbound however size of the queue does not exceed its maximum size

For the following question, write/draw neat and clean answers. No credit will be given for an incomplete or in-cohesive answer.

Question 2:

Scenario Overview

Ahmad is developing a Web site (**www.ahmadFindings.com**) and the website is expected to have huge traffic load hence he decides to provide replicated servers located throughout the internet. These servers are responsible to provide the pages to their nearest clients. Ahmad has divided his server replicas into two parts: Asia and Non-Asia. All the web requests generated from Asia must be handled by the servers located inside Asia while all other requests must be handled by the servers located outside Asia. [Note: DNS uses UDP as the underlying transport layer protocol]

System Topology: Suppose 2 routers exist between your system(S1) and any of the DNS hosts(Local DNS server, Root level, TLD, etc). Propagation delay between any two nodes (host to router **OR** router to router) is 2ms and transmission rate of each link is 2 Mbps. Ignore processing and queuing delay for all DNS queries. Size of the DNS packet is 512 bytes. Also, Suppose one router(R1) exists between your system and the nearest web server of the website (ahmadfindings.com).

System to router(R1) distance = Router(R1) to web server distance = 500-meter.

Each link has a transmission rate of 2 Mbps i.e**. Transmission rate of the link between System to R1 = Transmission rate of the link between R1 and the web server = 2 Mbps**

PART 2.1: Draw the diagram that shows your system, the web server, and all the routers and their connections as described above. Label each system/router and mention the transmission rate of each link. [6]

Part 2.2: For this part, suppose that 2 Mb (Megabits) long data messages can be exchanged between the web server and the host system(S1). Packets containing connection information (connection packets) are only 200 bits long. Further assume that there are N parallel connections active on the link between your host and the server, then each connection gets 1/N of the link bandwidth.

You are typing www.ahmadFindings.com for the **first time** in your browser's address bar and you hit Enter. Remember your location. You are in Lahore i.e. within Asia. The browser is configured to have 5 parallel connections at max and the web page associated with the link contains references to 10 objects on the same server each of size 1 Mb.

Show each step of your calculations clearly for the following.

a. **How much time will it take to completely load the page if Non-persistent HTTP is used.** **[8]**

b. How much time will it take to completely load the page if Persistent HTTP is used? **[4]**