United International **University** (**UIU**)

BSCSE Program

Final Assessment Year: **2023** Semester: **Fall** Course: **CSE 3711**

Title: **Computer Networks (Section – All)**

Marks: **40** Time: **2 Hour**

[Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.]

There are **03 (Three)** questions. Answer **all 03 questions**. All questions are of values indicated on the right-hand margin.

Q1

(a) Suppose that the following four bytes are being sent via UDP:
01101011 00100101 10011011 11010101

Now answer the following questions:

i. What will be the value of the checksum field in the UDP packet that is being sent? **2**

ii. Suppose the first bit in the second byte of the data being sent is changed while the UDP packet is being transmitted. How will the receiver know that the data was corrupted? Explain your answer by calculating the checksum at the receiver's end. **2**

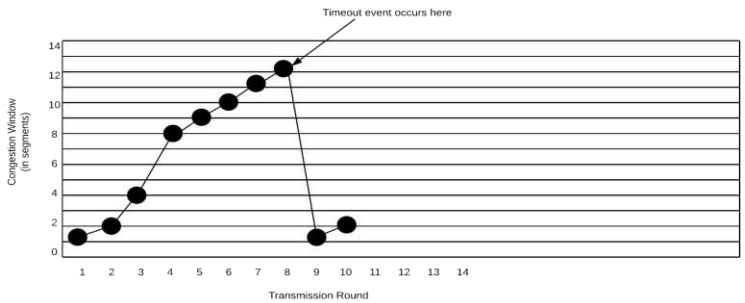
(b) A packet of length 1 Mb is being transmitted from sender to receiver using a stop-and-wait protocol where the window size is 5. The bandwidth of the connection between them is 1.5 Mbps and the round trip time (RTT) is 600 ms. What will be the utilization of the channel? **2**

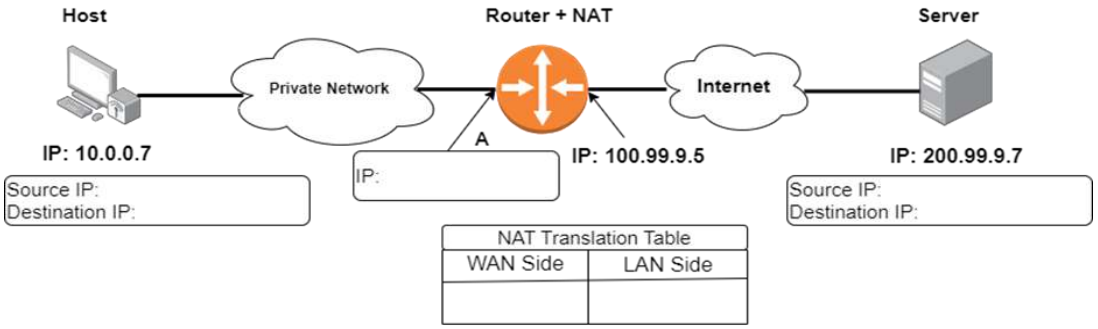
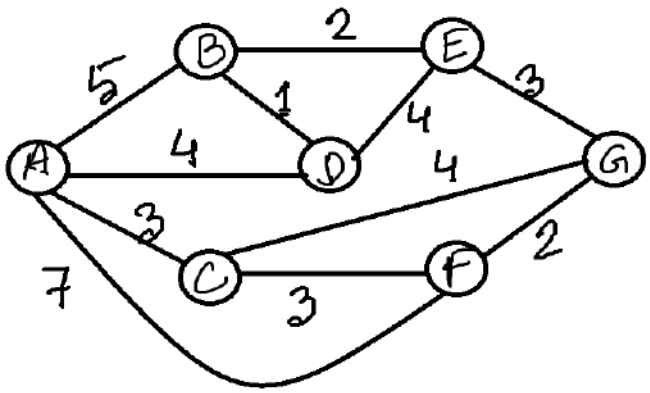
(c) In the case of a TCP connection, the sender sends two segments of data, the first one with Seq=92 and 8 bytes of data, and the second one with Seq=100 and 20 bytes of data. The sender receives a single packet with ACK=120. What will the sender do in this scenario? **1**

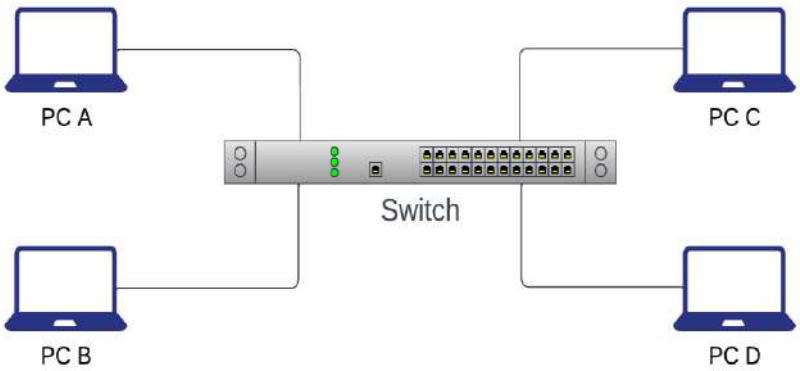
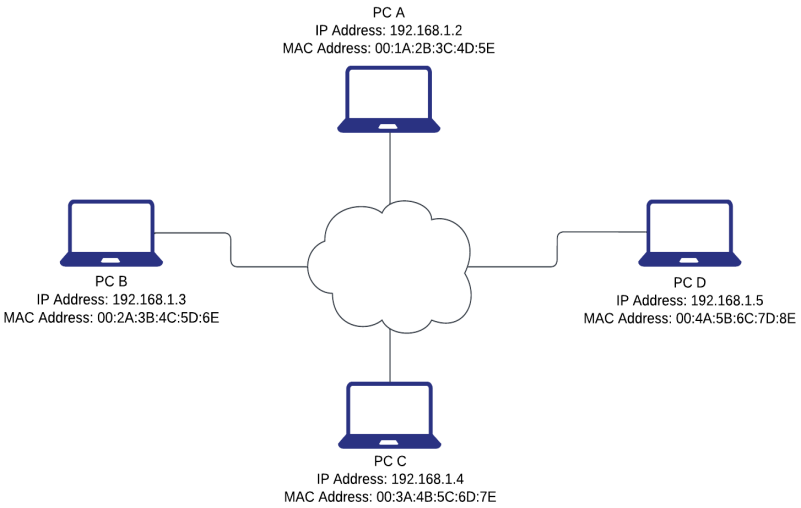
(d) Explain the process in which a TCP connection is closed using a sequence diagram and state changes. **3**

(e) What is flow control? How does TCP implement flow control? **2**

(f) Copy the following diagram showing the change in congestion window with each round of transmission in a TCP connection using TCP Reno and mark the values of the size of the congestion window for the next four transmission rounds. Assume that the initial value of ssthresh before the TCP transmission is 8, and that there is no packet loss in the next four transmission rounds. **2**



Q2	**a)** The Network layer is divided into two parts. Briefly explain the functions of each part.	**2**
	b) Suppose you are a newly connected host in a certain LAN and the IP address of the DHCP server is 227.1.3.5. Show the steps of the DHCP process for allocating an IP address for your host with diagrams and proper explanations.	**4**
	c) Consider the following scenario and update the entries of both the host and receiver and also of the NAT Table(both for sending from the host and receiving at the host). 	**2**
	d)	
	i. Express the following IPv6 address in compressed format: 2001:0db8:0000:1111:0000:0000:0000:0200	**1**
	ii. How many ways are there for IPv4 and IPv6 to coexist? Name them.	**1**
	iii. Suppose two IPv6 nodes(routers) want to interoperate using IPv6 datagrams but are connected by four(4) intervening IPv4 routers. Explain the process of communication between these two routers using proper diagrams.	**2**
	e) Given graph G = (V, E), where V is the set of routers and E is the set of links. Using Dijkstra's link-state routing algorithm compute the least-cost path from node A to all other nodes and draw the resulting least-cost path tree from A. 	**4**
	f) An IP router with a Maximum Transmission Unit (MTU) of 1500 bytes has received an IP packet of size 4480 bytes with an IP header of length 20 bytes. How will this packet be fragmented? Show each of the fragmented packets' length, fragflag, and offset fields.	**2**

Q3	a) Describe two of the channel partitioning MAC protocols.	**2**
	b) 	
	i. What is the self-learning property of switch?	**1**
	ii. Suppose that the switch table for the switch is empty. When PC B will send a frame to PC C, how will the switch manage to deliver the frame to the correct destination?	**1**
	iii. Show any changes in the switch table after completion of the task mentioned in question II. Assume that the TTL for every entry in the switch table is 60.	**1**
		
	c)	
	i. Suppose that PC B wants to communicate with PC D, but PC B only knows PC D's IP address. On the basis of the diagram shown above, using figures, show how PC A uses ARP to find the MAC address of PC D.	**2**
	ii. Also show the ARP table of PC B after finding the MAC address of PC D. Assume that the TTL for every entry in the switch table is 60.	**1**