United International University (UIU)

Dept. of Computer Science and Engineering (CSE)

Final Assessment Year: **2023** Semester: **Spring**

Course: **CSE 3711** Title: **Computer Networks (Section – A/B/C/D)**

Marks: **40** Total Time: **2 Hours**

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

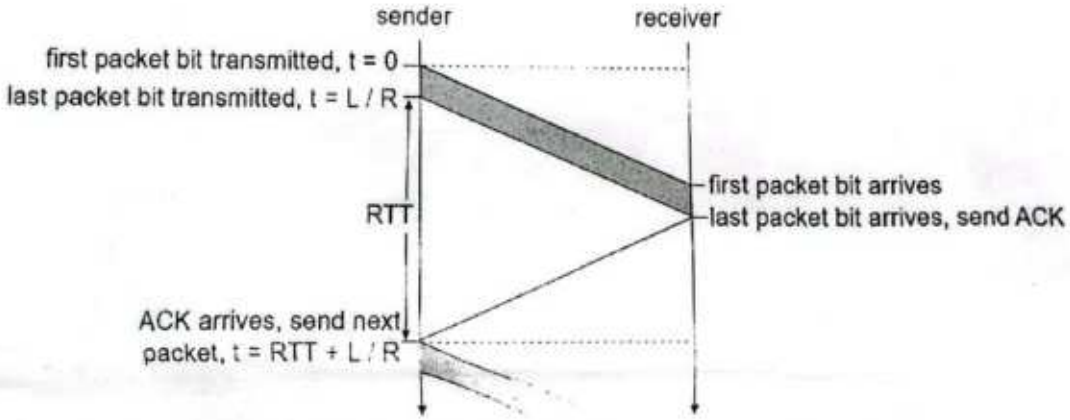
There are **3 (Three)** questions. Answer **all 3 (Three)** questions. All questions are of values indicated on the right-hand margin.

Q1. a) What do you mean by "TCP byte stream"? **[2]**

b) TCP supports bi-directional data flow. How does TCP send both data and acknowledgement inside the same segment? **[2]**

c) In case of a TCP connection, the sender sends four segments of data with sequence number 300, 400, 500 and 600 where each segment size is 100 bytes. The sender receives, three ACKs with 400. Explain the action taken by the sender with a sequence diagram. **[3]**

d) Using the following figure, explain how pipelining can increase the utilization of a channel from the stop and wait protocol. Show necessary calculations assuming, pipeline size n = 4, RTT = 1.5s, Packet Size = 1500 bytes and Transmission Rate = 1000kbps. **[2]**



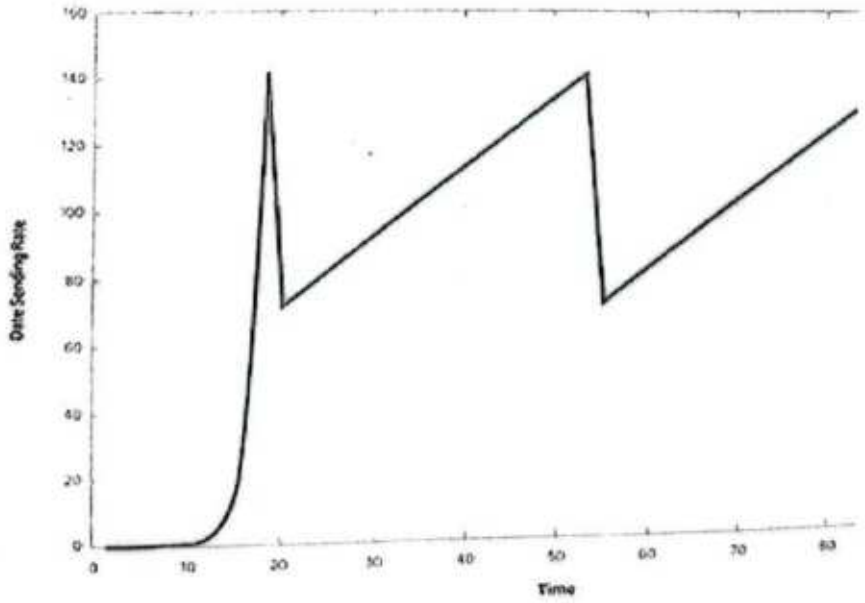
e) Differentiate between the Go-Back-N and Selective Repeat Request protocols in terms of: **[2]**

(i) Retransmission of packets

(ii) Acknowledge sent by the receiver

f) Following is the classic sawtooth pattern of TCP where x-axis represents time and y-axis represents data sending rate. Using the following curve explain (i) TCP packet sending at the starting and (ii) TCP congestion control approach

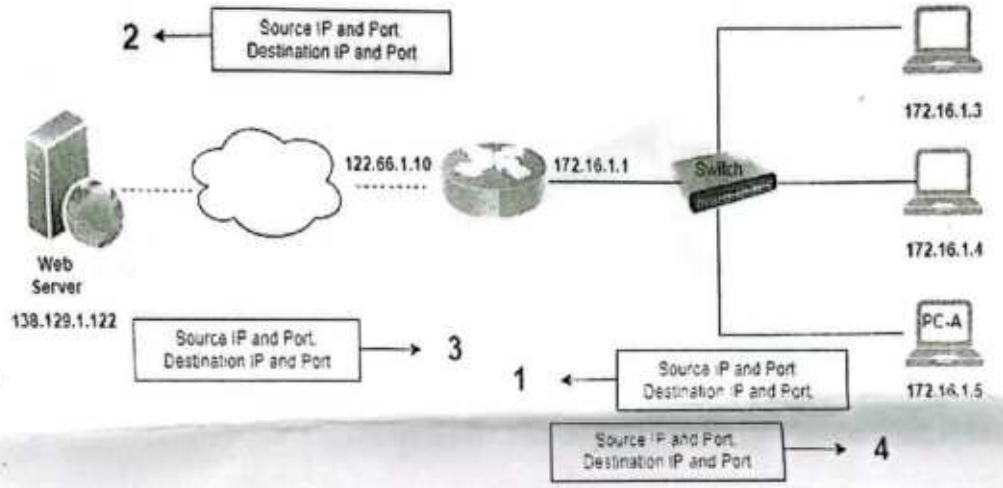
[2+2]



Q.2 a) Answer the following questions: [5]

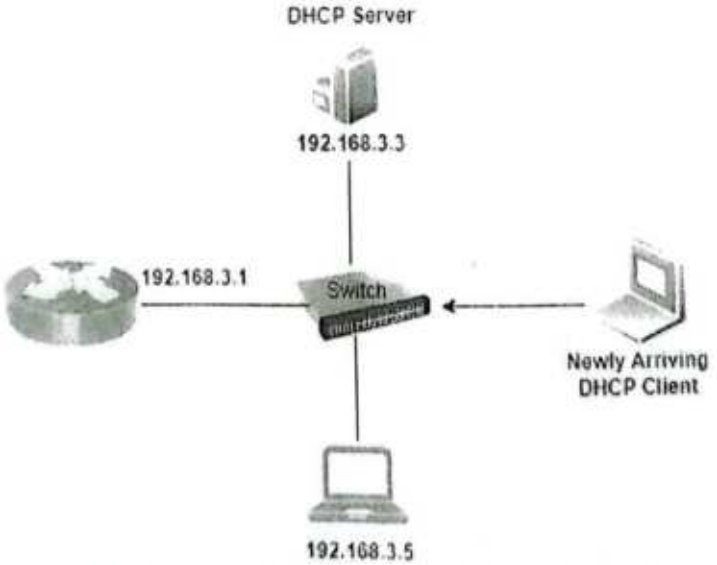
i. What are the responsibilities of network layer?
ii. What is the use of NAT?
iii. How do you differentiate between forwarding and routing?
iv. What is the maximum size of data that can be accommodated in an IP datagram and what is the size of an IP header?
v. What is the difference between link state and distance vector routing protocols?

b) Let us consider the following scenario, where PC-A is communicating with the web server. Carefully study the diagram and fill-up the required information of 1, 2, 3 and 4. Please note that NAT is implemented in the router. [3]



c) Consider the following scenario of DHCP client and server, where a newly arriving DHCP client needs to obtain an IP address through some processes. Using a client-server interactive diagram show all steps of the DHCP protocol.

[2]



d) 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 S to all other nodes and draw the resulting least-cost-path tree from S. [5

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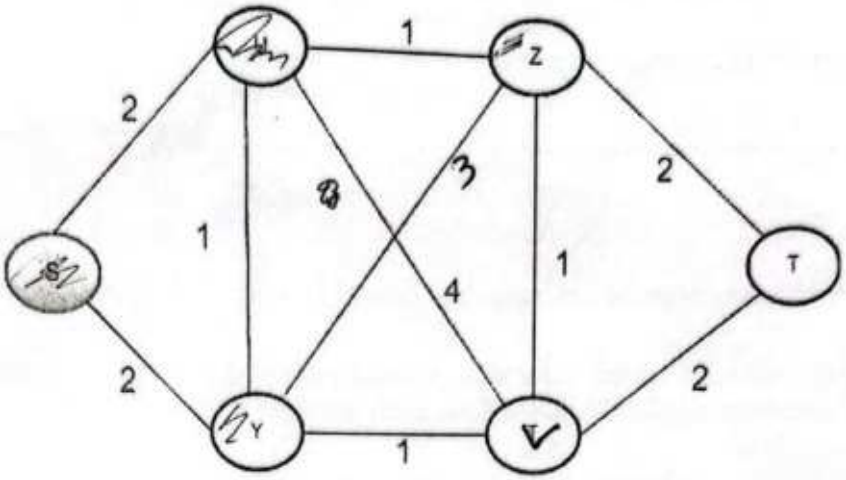
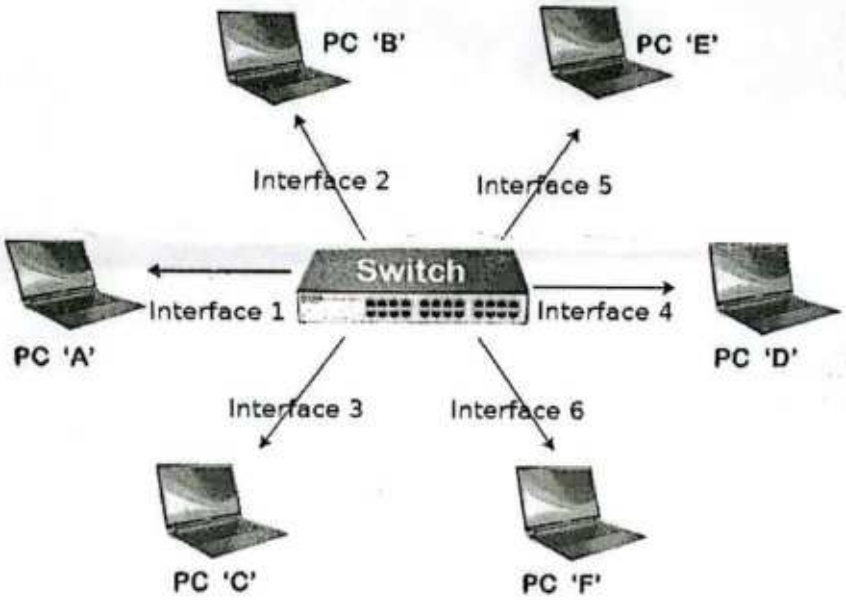


Q3. a) Describe three of the services offered by the data link layer. **[3]**

b) The given diagram below shows a single switch connecting 6 PCs.



Now answer the following questions:

i) What is a switch table? What is the purpose of a switch table? **[1 + 1]**

ii) Suppose that the switch table for the switch is empty. When PC 'A' will send a frame to PC 'C', how will the switch manage to deliver the frame to the correct destination? Also, show any changes in the switch table using a diagram. Assume that the TTL for every entry in the switch table is 60. **[2]**

iii) When PC 'C' receives the frame from PC 'A', it sends a reply back to PC 'A'. How will the switch deliver this frame back to its correct destination? Show any changes in the switch table during this process using a diagram. Assume that the TTL for every entry in the switch table is 60. **[2]**

iv) What is the advantage of using a switch instead of a router for connecting these six PCs? **[1]**

End of Paper - Thank You