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

Dept. of Computer Science and Engineering (CSE)

Final Assessment Year: **2021** Semester: **Fall**

Course: **CSE 323** Title: **Computer Networks (Section – A/B/D/E)**

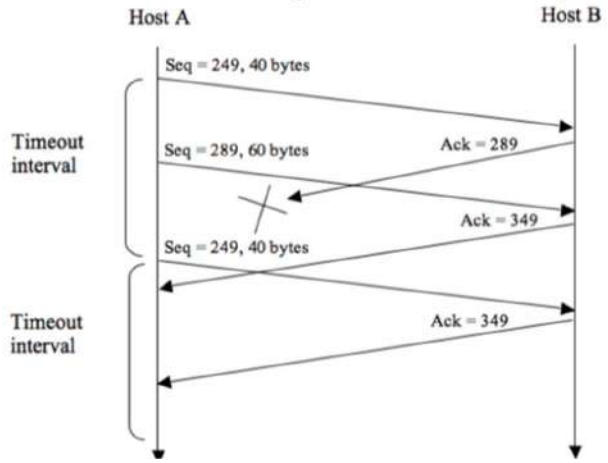
Marks: **40** Time: **2 Hours + 15 minutes (for uploading)**

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

There are **4 (Four)** questions. Answer **all 4 (Four)** questions.

Q.1 a) What is **TCP Fast Retransmit**? When does such a case happen? **Explain** with diagrams. **[3]**

b) Consider the following **TCP data transfer** diagram:



i) What is the new value of **SendBase** at **Host A** after receiving the **Ack # 349**? **[1]**

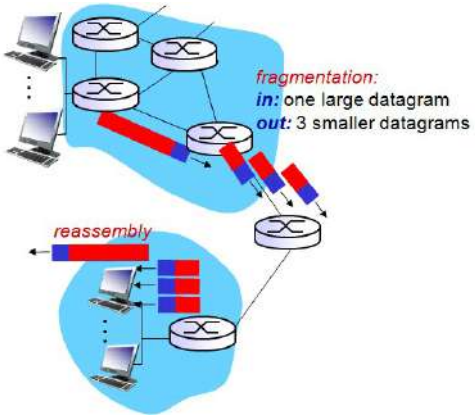
ii) What will be the **change in the given sequence** if the **second Ack (#349)** comes **before** the first timeout interval? **Draw the diagram** with changes. **[2]**

iii) If instead of **first Ack (#289)**, **first data segment** (seq # 249, 40 bytes) is lost, what will be the **Ack** sent by **Host B** for the **second segment** (Seq # 289, 60 bytes) sent by **Host A**? **[2]**

c) Considering **end-to-end congestion control**, what is the problem with **AIMD** & **Slow Start** approach? How **Congestion Avoidance** approach solves the problem? **[2]**

Q.2 a) The network layer can be decomposed into **two interacting parts**: **Data** and **Control** Planes. **Describe** each of them briefly and **illustrate** how they are handled in **traditional** approach and **SDN** approach. **[3]**

b) Consider the following diagram. A datagram of **4,020** bytes (**20** bytes of IP header plus **4,000** bytes of IP payload) arrives at a router and must be forwarded to a link with an **MTU** of **1,500** bytes. The diagram shows **three fragments**. **Show** the **sizes** of the fragments (in bytes) along with the **offset values** associated with each fragment with a chart. **Explain** how it is done with your own words. **[3]**



c) Given **04 hosts** in a LAN, with **private IP** addresses **192.168.1.10, 192.168.1.11, 192.168.1.12, and 192.168.1.13**. Consider that the LAN is behind a **NAT'd router** which is between the **04 hosts** and the **Internet**. The IP datagrams sent from, or destined to, these **04 hosts** must pass through the **NAT router**. The **router's interface** on the LAN side has IP address **192.168.1.254**, while the **router's address on the Internet side** has IP address **131.122.102.202**. Suppose, the host with IP address **192.168.1.13** sends an IP datagram to a host **129.108.107.188** that resides in the Internet. The **source port** is **4404**, and the **destination port** is **80**. **[1 + 1 + 1 = 3]**

Answer the following questions:

i. What are the **source and destination IP addresses** for this datagram, when the datagram that is sent by the host **hasn't reached the router yet**?

ii. What are the **source and destination IP addresses** of the datagram, when the datagram is **transmitted by the router**? Is the source port changed? **Yes** or **No**.

iii. What are the **source and destination IP addresses** of the datagram, when the datagram is just **about to be received by the host** via the router?

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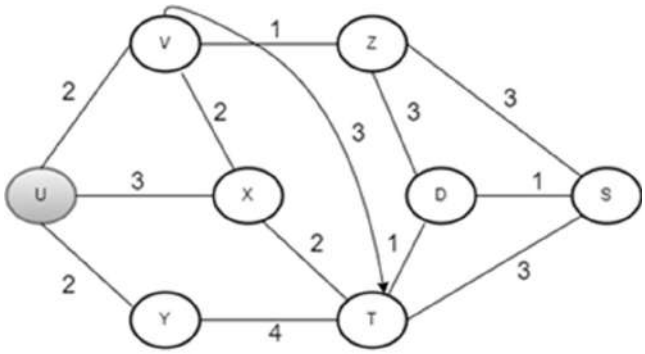
Q.3 a) What are the **three major limitations** of **IPv4**? Describe with **diagrams** how the ***tunneling*** **process** is implemented when for a particular route, both IPv4 and IPv6 networks are operating. **[1 + 2 = 3]**

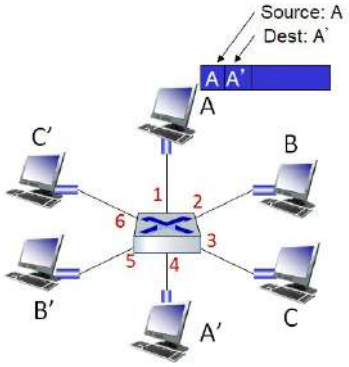
b) What are the **two main formats** in which IPv6 address is represented? **Explain** with clear examples. Consider a case that your organization decided to enable IPv6 compliant devices and technologies for the whole network. How would it then communicate with the outside networks that are using the IPv4 networks? **Explain**. **[3]**

c) Given graph *G = (N,E), where N 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 U to all other nodes and show the resulting least-cost-path tree from U.* **Show all calculations** to get full credit. **[6]**



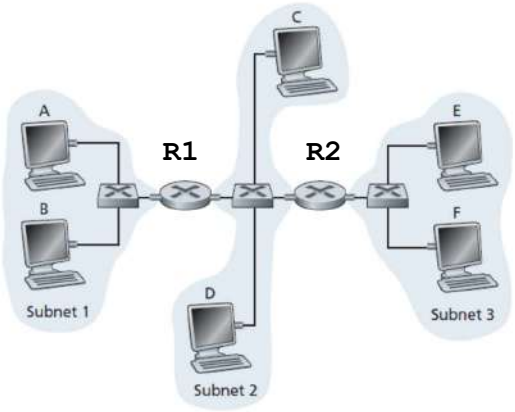
Q.4 a) What does **MAC** stand for? Describe in detail the **three classes** of **MAC** protocols. **[2]**

b) Consider the scenario presented below. Here a Switch is used in the center and **node A** would be sending packet to **node A'**. **[2 + 1 = 3]**



Explain the concept of **self-learning** of a Switch with necessary diagrams. What if a **Hub** is used instead of the Switch?

c) Consider the following diagram to answer the questions.



i. Consider sending an IP datagram from **Host C** to **Host D**. Suppose, **Host C's ARP table** is empty. **What** will be the **destination MAC** of the ARP query **Host C** will send? **Which nodes** in the network will **receive** the query? **Which node(s)** will **reply** the query? **[2]**

ii. Now, Consider **PC E needs** to communicate with **PC A**. **Whose MAC address** is needed by **PC E** to send data to **PC A**? **List all the steps** by **PC E** to send **data frame** to **PC A**. **[2]**

←End of Paper – Thank You→