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

Dept. of Computer Science and Engineering (CSE)

Final Assessment Year: **2021** Semester: **Summer**

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

Marks: **25** Time: **1 Hour 15 minutes + 15 minutes (for uploading)**

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

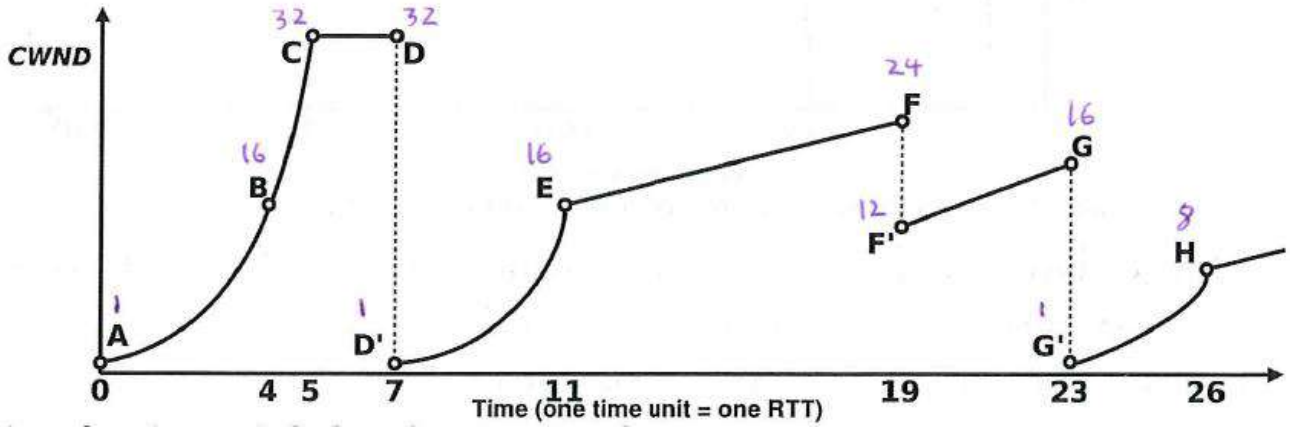
There are **4 (Four)** questions. Answer **all 4 (Four)** questions.

Q.1 a) **Host A** and **B** are communicating over a TCP connection, and **Host B** has already received from **Host A** all bytes up to **byte # 800**. Suppose **Host A** then sends **three segments** to **Host B** back-to-back starting the **first segment** with **sequence # 801**. The first, second & third segments contain **100, 150** and **200 bytes of data**, respectively. **Host B** sends an acknowledgement whenever it receives a segment from **Host A**. Suppose the **second segment** is lost and **first** & **third segment** is correctly received by host B.

i. What are the **acknowledge numbers** sent by **host B** for segment 1 & 3? **[1]**

ii. Describe **what will happen** after the **first timeout interval**? (**Hint:** which segment will be retransmitted and what will be the acknowledgement number by host B for the received segment) **[2]**

b) Consider the figure depicted below where the ***x*-axis** indicates **time** in **RTT** and the ***y*-axis** indicates **congestion window size**. Using **TCP Reno**, which supports ***fast retransmission***, answer the following questions:

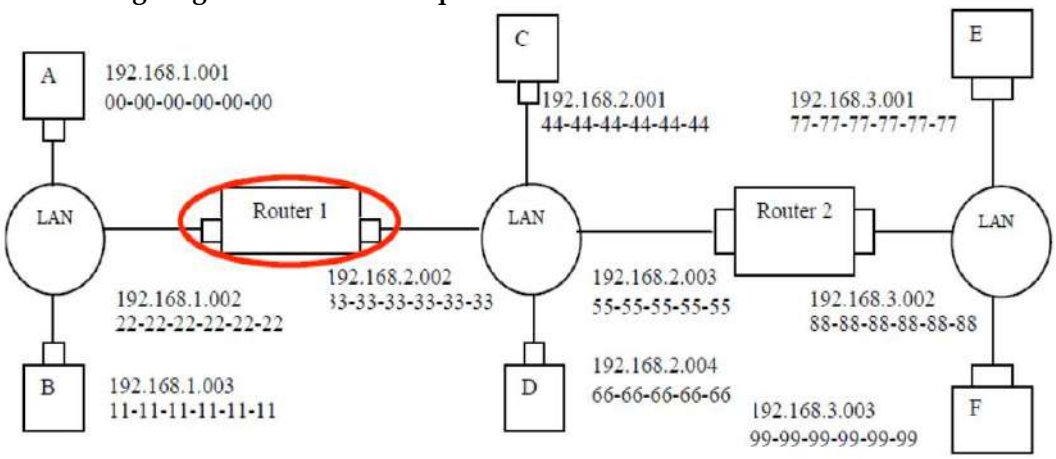


i. What is the **effect of fast retransmission** when a loss occurs? **[1]**

ii. If a TCP protocol doesn't support fast retransmission (for example, TCP Tahoe), what will happen when a loss occurs? **[1]**

iii. For all the **lost packets** in the above diagram, identify the **type of loss** (timeout/3-dup) and **find** the values of ***cwnd*** and ***ssthresh*** after the loss. **[2]**

Q.2 Consider the following diagram to answer the questions.



Suppose **Host A** would like to send an IP datagram to **Host F**, and assume that **A's ARP table** is initially **empty**.

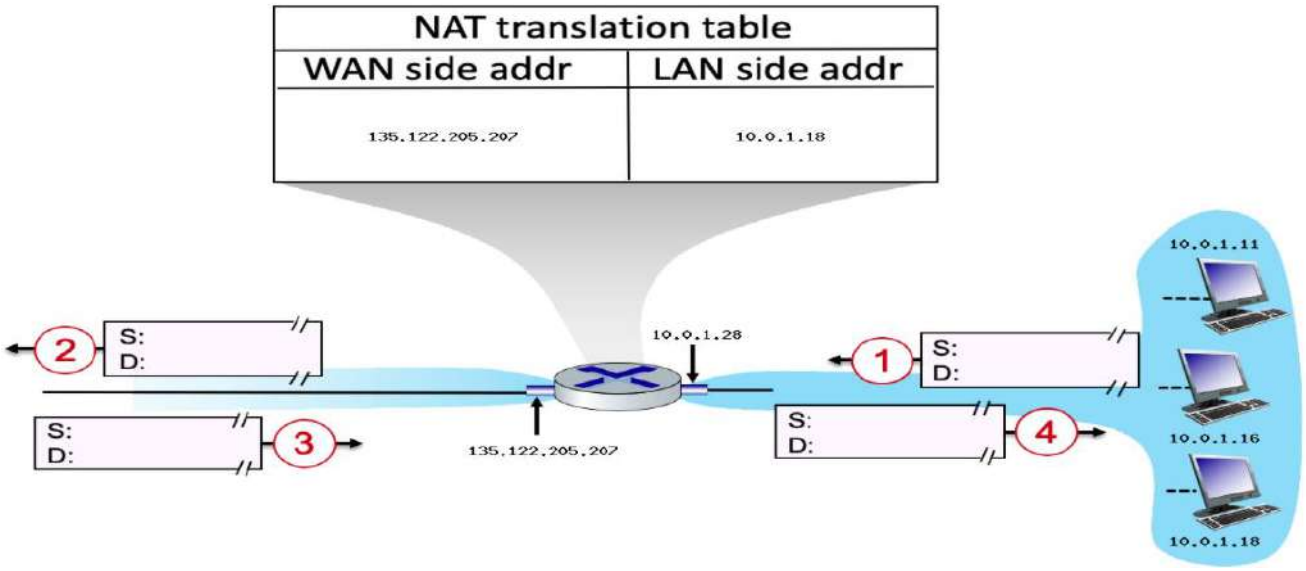
i. **What** will be the **destination MAC** of the ARP query sent by **Host A**? **[1]**

ii. **Which nodes** in the network will **receive** the ARP query from **Host A**? **[1.5]**

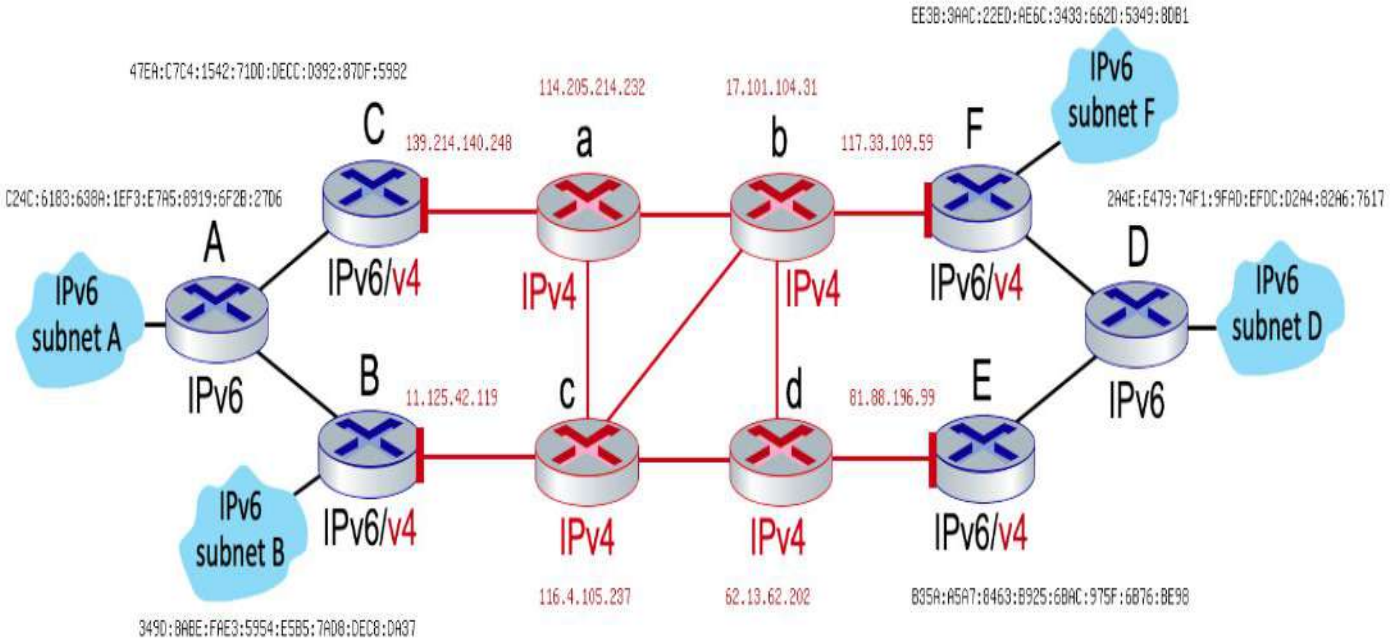
iii. **Which IP** address will respond to the ARP query sent by **Host A**? **[1.5]**

iv. In the **Ethernet Data frame** (containing the IP datagram destined to F) that is delivered to **Router 1**, what are the **source and destination IP and MAC addresses**? **[2]**

Q3. a) There are three hosts, each with a IP address of 10.0.1.11, 10.0.1.16, and 10.0.1.18, are in a LAN behind a NAT capable router that lies between them and the Internet. All IP packets transmitted to or from these three hosts must cross via this NAT router. The LAN interface of the router has an IP address of 10.0.1.28 which is the default gateway of that LAN, whereas the Internet interface has an IP address of 135.122.205.207. Assume that the host with the IP address 10.0.1.18 transmits an IP packet to the host with the IP address 130.210.77.67. The source port is 2878, and the destination port is 80. **Now, fill up the source and destination IP addresses at steps 1, 2, 3, and 4.** **[4]**



b) Consider the network scenario depicted below, which has four IPv6 subnets connected by a combination of IPv6-supported routers (A, D), IPv4-supported routers (a, b, c, d), and dual-stack IPv6&IPv4 routers (B, C, E, F).



Assume a host in subnet A tries to send an IPv6 packets to a host in the D-subnet. The forwarding between these two hosts follows the path: A→ B → c → a → b → F → D [2]

Now answer the following:

i. Is the packet being sent from **A to B** an IPv4 or IPv6 packet?
ii. Is this **A to B** packet encapsulating another packet? Yes or No.
iii. Is the packet being sent from **B to c** an IPv4 or IPv6 packet?
iv. What is the destination IPv4 address of this **B to c** packet?

Q4. Perform Dijkstra's routing algorithm on the following graph. Here, Source node is **u**, and Destination node is **z**.

i) Find the least cost path from **u** to **z**. [4]

ii) Find the resulting forwarding table at **u**. [2]