



[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.

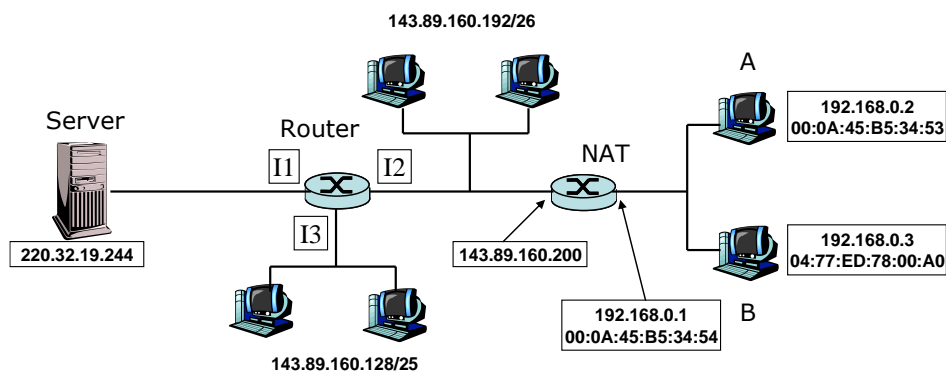
Q.1 a) Fill up the following table according to the responsibilities of the **transport layer, network layer** and **data link layer** (if more than one layers apply, list all layers). [3]

Responsibility	Layer(s)	Responsibility	Layer (s)	Responsibility	Layer (s)
1. Provides reliability		2. NAT/PAT		3. CSMA/CD used in	
4. Uses Mac table		5. Flow control		6. Path determination	
7. Congestion control		8. Uses ARP		9. Fragmentation	

b) Suppose **Host A** sends **two TCP segments** back to back to **Host B** over a TCP connection. The **first segment** has sequence number **650**; the **second** has sequence number **900**. The **MSS** is **1024**. The last acknowledgment number is **450**.

- What is the **current value of sendbase**? [1]
- How much data** is in the **first segment**? [1]
- Suppose the **first segment is lost** but the second segment arrives at B. In the acknowledgement that **Host B** sends to **Host A**, what will be the **acknowledgement number**? [1]
- Suppose, both segments are received in order by **Host B**, the **first acknowledgement is lost** and the **second acknowledgement** arrives before the timer expires. **What will happen** after the timeout? **Explain.** [1]

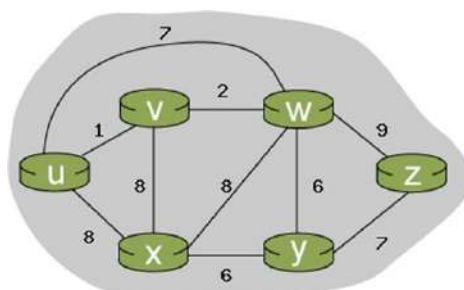
Q.2 a) Consider a network setting in the following figure. **Node A** and **node B** are in a LAN behind the NAT. The public IP configured in the NAT router is shown in the diagram: **143.89.160.200** with port numbers **7777** to **8888**. Assume that the server with IP address **220.32.19.244** hosts **two services**: a **web server** using port number **80**, and an **e-mail server** using port number **25**.



- Suppose, a user in **Host A** is accessing **e-mail Server** from his PC using client port # **6700**. List the **source & destination IP address** and **port numbers** in the packet arriving at the NAT router from the **Server**? [2]
- Now, suppose users in both **Host A** and **Host B** are **checking E-mail** (using server port # **25** and client port # **6700**) and **searching some materials in google** (using server port # **80** and client port # **8900**) simultaneously. Show the **corresponding entries** in NAT translation table for the NAT Router. [2]

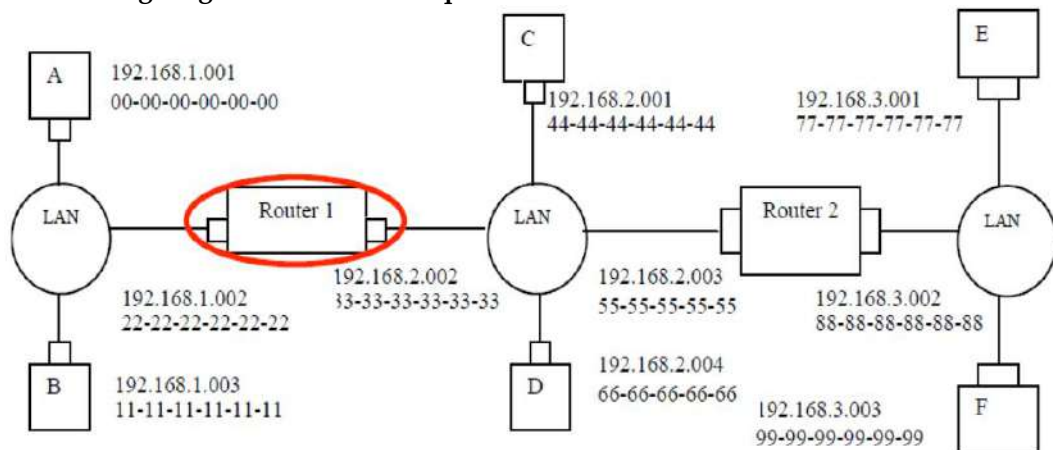
b) The entries in a **routing table** are **(178.50.108.0/22, port 0)**, **(178.50.108.0/23, port 1)** and **(178.50.108.0/24, port 2)**. These entries indicate network number, the prefix indication and the corresponding port to which a packet should be forwarded. If a packet arrives with a **destination IP address** equal to **178.50.109.11**, **which port** will this router forward the packet to? **Show** calculations. [2]

c) Consider the network shown in the following diagram on the right. Use **Dijkstra's link-state algorithm** to compute the **forwarding table** for **V**. To get credit for this question, you should **show all calculations** of the algorithm. [6]





Q.3 Consider the following diagram to answer the questions.



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

- Will **Host B** perform an **ARP query** to find **Host E's MAC address**? **Why?** [2]
- What will be the **destination MAC address** in the **ARP query** sent by **Host B**? [1]
- Which IP address** will respond to the **ARP query** sent by **Host B**? [1]
- In the **Ethernet Data frame** (containing the IP datagram destined to **E**) that is delivered to **Router 1**, what are the **source and destination IP and MAC addresses**? [2]

End of Paper – Thank You