

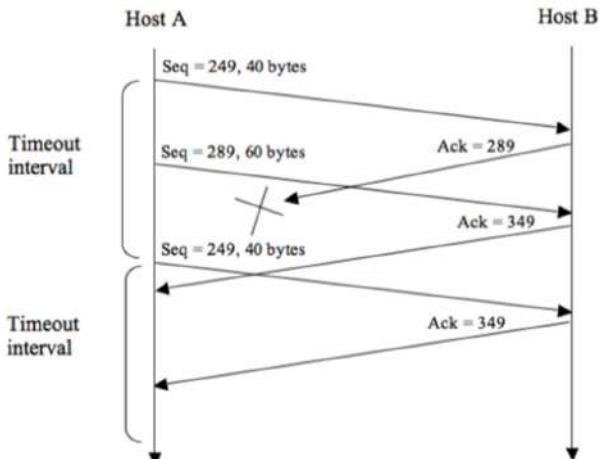


[Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.]

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

Q.1 a) Draw an FSM (Finite State Machine) diagram showing **rdt2.0** error scenario. Label different interactions properly. [6]

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

Q.2 a) What is **Pipelining**? Explain with a diagram how **pipelining** can increase the utilization factor. [1 + 2 = 3]

b) A datagram of **5,500 bytes** arrives at a router that should be forwarded to a link with an **MTU of 1,300 bytes**. Suppose the original datagram is stamped with an **identification number of 128**. Assume that the size of the **IP header is 20 bytes**. With a diagram show different fragments including the length, ID, **fragflag** and offset values. [3]

c) Given a network diagram (Fig. 1.) as a graph $G = (N, E)$, where **N** is the set of routers and **E** is the set of links, use **Dijkstra's link-state routing algorithm** to compute the least cost path from **node b** to all other nodes and show the resulting **least-cost-path tree** from **b**. Show all calculations to get full credit. [6 + 2 = 8]

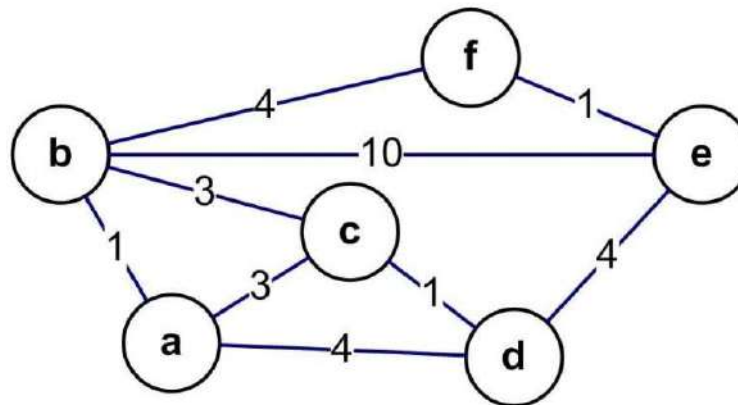


Fig. 1.

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

b) What are the **two main formats** in which **IPv6** address is represented? **Explain** with clear examples. [2]

c) There are two approaches to structuring **network control plane**. What are those? [3]

Q.4 a) What is the difference between **forwarding** and **routing** operations of a router? [3]

b) What is a domain in networking? Why is it needed? Show with a diagram how the **inter-** and **intra-routing** between domains happen. [1 + 1 + 3 = 5]



c) Consider the diagram in **Fig. 2** to answer the questions.

[3 + 3 = 6]

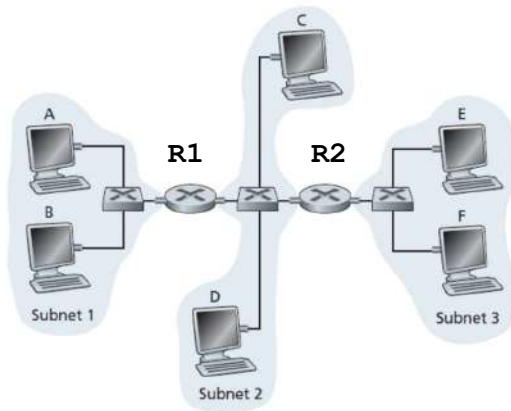


Fig. 2.

- 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?
- 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**.

←End of Paper – Thank You→