

BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination : Semester Final
 Duration: **2 Hours**

Semester: **Spring 2025**
 Full Marks: **70**

CSE421 / EEE465 : Computer Networks

Answer **Sections A, B and C** as per instructions given. (**Pages: 3**)

Figures in the right margin indicate marks.

Name:

ID:

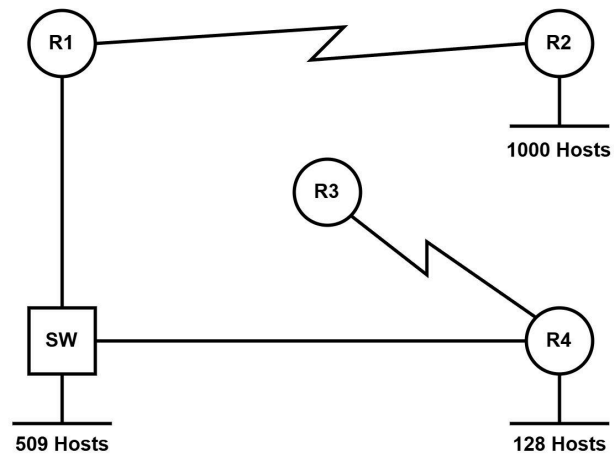
Section:

SECTION A [All questions of this section are MANDATORY] - 40 MARKS

Q1 Your company gave you an IPv4 address 3.12.66.26/19. Your company network needs to be divided into different subnetworks. The topology for your company network is shown on the side. **The number of hosts given in the topology only includes end devices.**

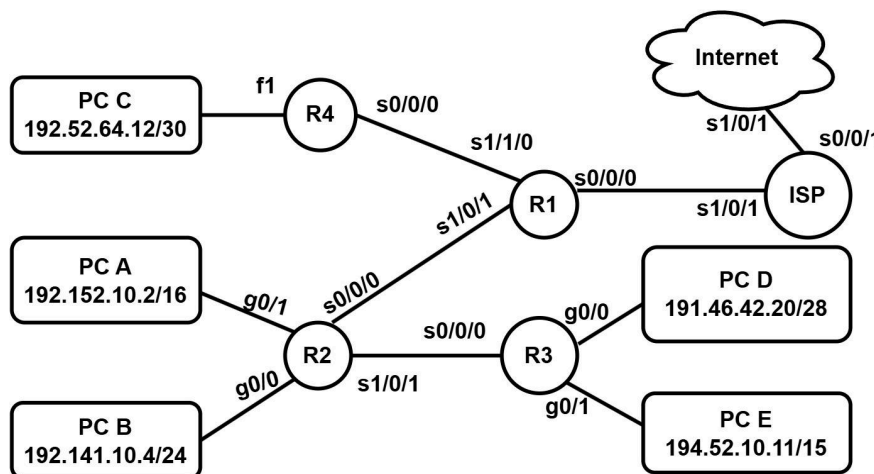
- [CO3] **I.** Find the network address.
 [CO3] **II.** Apply VLSM using the network address from (I) to create the sub network addresses for the topology shown efficiently.

- [CO3] **III.** Calculate the number of IP addresses wasted for the R2 LAN.



3
+
10
+
2

Q2



KEY(WAN Network -> their network address)
 R1 & ISP -> 192.64.52.0/24
 R1 & R4 -> 192.44.0.0/16
 R1 & R2 -> 192.10.11.0/24
 R2 & R3 -> 191.54.20.128/25

KEY(Interface -> their 4th octet IP)
 s0/0/0 -> .1
 s1/0/1 -> .2
 s1/1/0 -> .3
 g0/0 -> .2
 g0/1 -> .1

- [CO2] **I.** From the routing table, mention how you can identify the directly connected networks
 [CO3] **II.** Configure a recursive default static route on R2.
 [CO3] **III.** Configure a directly attached floating default static route in R2 for the above if R3 is connected to another ISP using interface s0/0/1.
 [CO2] **IV.** Determine the significance of [40/0] in the routing table.
 [CO2] **V.** Why is a directly attached static route better than a recursive route?

3
+
4
+
4
+
3
+
3

Q3	A packet of size 4584 bytes including 42 bytes of header was fragmented for transmitting in a link with MTU=X bytes. The 9th packet has a size of 362 bytes. It also has its MF bit set.	2
[CO3] I.	Calculate the value of X.	3
[CO3] II.	Calculate the fragment offset for the 5th packet.	3
[CO3] III.	Find out the total number of fragmented packets.	3

END OF SECTION A

[CO3] SECTION B [Answer ANY TWO out of THREE in this section] - 12 MARKS

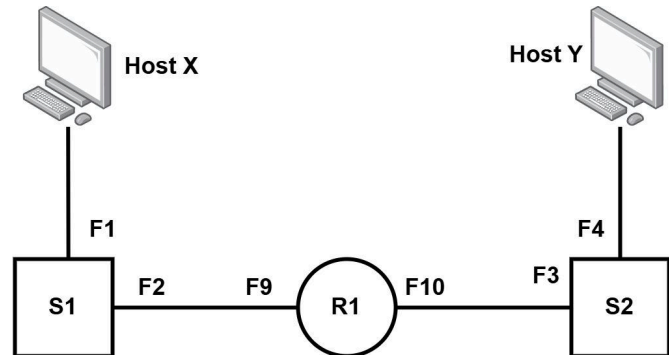
Q4	Refer to the topology given in Q2, I. If the routers use a link-state routing algorithm , after how many iterations will R3 learn how to reach PC C ? II. Using the same algorithm, how will R1 detect if its connection to R4 is lost?	3 + 3
Q5	Apply your knowledge of IPv6 address formatting to transform and expand the following addresses into their longest possible form in hexadecimal according to IPv6 rules. Also, identify the type of the address and explain in one sentence the purpose of that address type. I. 2001:0db8:12af:1::0:3 II. ::	3 + 3
Q6	Why might some routers or firewalls block ICMP traffic? State one example to explain why.	2 + 4

END OF SECTION B

[CO2] SECTION C [Answer ANY THREE out of FIVE in this section] - 18 MARKS

Q7	What's the significance of "MTU Discovery" packet? Why do we need it?	6
Q8	After accepting the DHCP Offer Packet, the client broadcasts the DHCP Request packet. Even though it has accepted the offer of a specific server, it still needs to broadcast. Why is that? How is this packet different when renewing the lease of the IP?	6
Q9	Rajib, a solo game developer, has built a multiplayer shooting game and is hosting the game server on a machine inside his home network. While Rajib can connect to the server and play locally without issues, his friend Saif—trying to join from outside Rajib's network—is unable to connect to the game. I. What is the likely cause of this connectivity issue? II. What configuration or networking solution can Rajib implement to allow external players like Saif to connect to his locally hosted game server?	6

<p>Q10</p>	<p>A global organization has deployed multiple identical DNS servers in different geographical locations. Each server is configured with the same IPv6 address, despite the common practice of avoiding duplicate addresses on the Internet.</p> <p>I. What type of IPv6 address configuration is this called, and why is this exception made in this case?</p> <p>II. Explain the key benefits this addressing approach offers in terms of performance and reliability for a global service.</p>	<p>6</p>
<p>Q11</p>	<p>Host X (IP: 10.0.1.1, MAC: 11-11-11-11-11-11), Host Y (IP: 10.0.2.2, MAC: 22-22-22-22-22-22) are connected according to the topology on the side. All ARP and MAC tables are initially empty.</p> <p>I. When Host X wants to send an IP packet to Host Y, what will be the destination MAC address in the frame it sends? Explain how it is determined and describe the role of ARP in this process.</p> <p>II. Why are switches called self-learning devices? Illustrate your answer with reference to this scenario.</p>	<p>6</p>



END OF SECTION C

===== **THE END** =====

*Why was the router so good at making decisions?
It always knew the best path.*