

BRAC UNIVERSITY
Department of Computer Science and Engineering

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

Semester: **Summer 2024**
 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:
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SECTION A [All questions of this section are MANDATORY] - 40 MARKS

Q1 [CO3]	<p>As a network administrator, you are asked to design a subnetted network structure using VLSM. However, the organization is unable to provide you with a network address. Being an expert, you go to a computer and get its IP configuration:</p> <p style="margin-left: 40px;">IPv4 Address : 107.168.177.108 Prefix Mask : 17 Default Gateway : 107.168.177.1</p> <p>I. Calculate the subnet mask of the network. II. Identify the network address of the organization. III. Using the network address found for the main network, efficiently apply VLSM to find the network address of the subnets as per the following host requirement: LAN A - 2500 hosts, LAN B - 1200 hosts, LAN C - 1050 hosts, and two WAN Links.</p>	2 + 4 + 10
Q2 [CO2]	<p>Devices A and B, with IP addresses 172.16.11.5/16 and 172.16.11.11/16 respectively, both send packets using the same source port (42230) to a game web server on the Internet. The packets pass through an ISP router, which performs PAT using a single IP address (209.123.123.45/24) before forwarding them to the game web server.</p> <p>I. When a reply from the game web server is received by the ISP router, how does the ISP router determine which device to send the reply, device A or B? Explain briefly. II. State the type of address that device A and B uses, and how it is different from the single IP address used by the ISP router for PAT.</p>	6 + 6
Q3 [CO3] [CO3] [CO3] [CO2]	<p>A packet of size 7240 bytes including 40 bytes of header arrive at a router. The router can send at most 800 bytes at a time through the link and thus fragment accordingly.</p> <p>I. Calculate the number of fragments that will be created. II. Calculate the fragment size of the last fragment. III. Calculate the fragment offset of the 8th fragment. IV. Explain why the MF bit is always zero for the last fragment.</p>	2 + 3 + 4 + 3

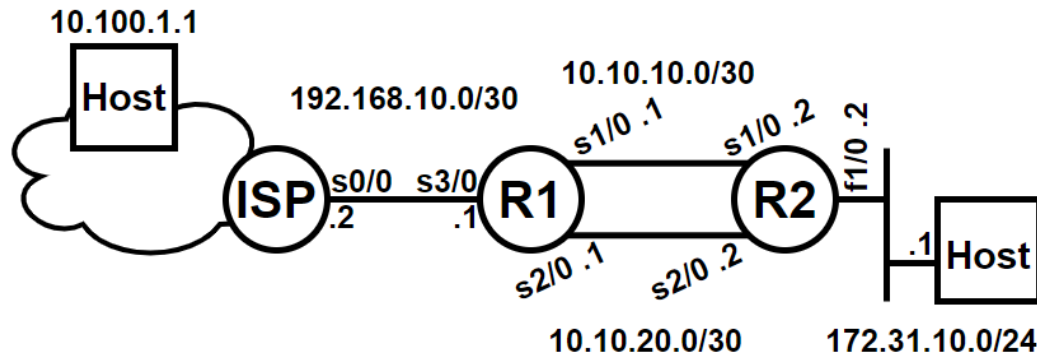
END OF SECTION A

Q4 Write the shortened version of the following IPv6 addresses:

- I. 2001:0db8:0000:0000:0001:0000:0000:0100
- II. ff02:0000:0000:0000:0000:0000:0000:0001
- III. 2001:0000:0000:3C10:0000:0000:0000:0000

2
+
2
+
2

Q5



3
+
3

Refer to the topology above. Since this is a stub network, static routes are preferable. The following static route command was given in the R1 router

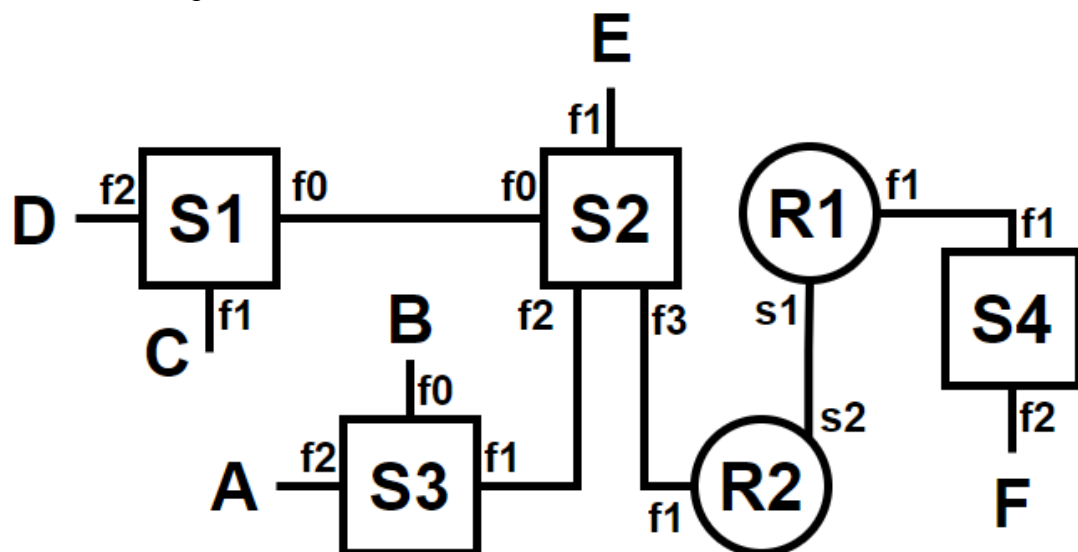
```
ip route 172.31.10.0 255.255.255.0 10.10.10.2
```

- I. State the problem of this command and how to improve it.
- II. If the network administrator wishes to configure default static routes, in which routers should s/he configure them? Justify your answer.

Q6 Refer to the figure given below.

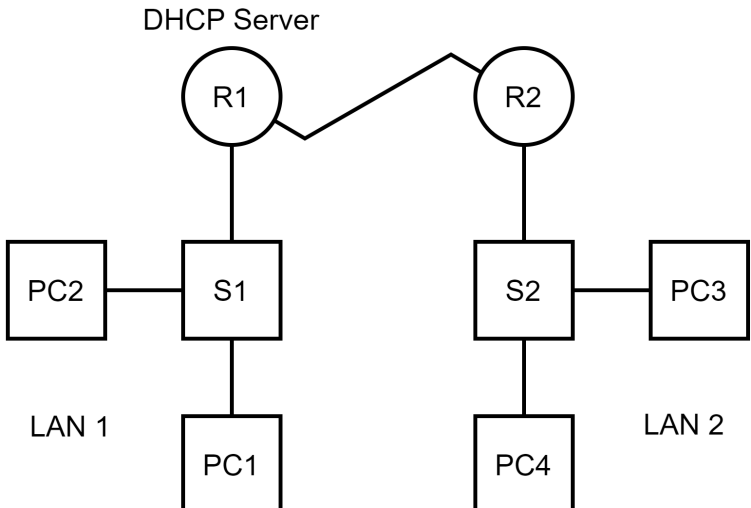
- I. Device E sends an ARP request for the MAC address of device A. State which intermediary devices will receive the ARP request frame and forward it to other ports. Also state which intermediary devices will drop the frame.
- II. Show the entries of the MAC address tables of S2 and S3 after receiving the reply to the ARP request.

4
+
2



END OF SECTION B

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

Q7	Name the field that has been added in the IPv6 header, which was not present in the IPv4 header. Explain what we need it for.	6
Q8	State why Distance Vector routing protocol is a decentralized protocol, and state at least two differences between Distance Vector routing protocol and Link State routing protocol.	6
Q9	<div style="text-align: center;">  <p>The diagram shows a network topology with two LANs. LAN 1 (left) contains PC1, PC2, and switch S1. LAN 2 (right) contains PC3, PC4, and switch S2. Two routers, R1 and R2, are connected to each other. R1 is connected to S1, and R2 is connected to S2. A DHCP Server is connected to R1.</p> </div> <p>I. No DHCP requests from any PCs of LAN2 are reaching Router R1, which has been configured as a DHCP server. Identify the issue and state the solution.</p> <p>II. State the messages that are exchanged between any PC and a DHCP server for renewal of a leased IP address.</p>	4 + 2
Q10	<p>Given your MAC address is AF:CC:FE:12:23:40.</p> <p>I. Identify the OUI part of the MAC address.</p> <p>II. Discuss why the MAC address is considered to be a flat address.</p>	3 + 3
Q11	A router gets an ARP request packet. List the steps that the router will perform in all possible scenarios. State what is in the destination MAC address of the ARP packet that the router received.	6

END OF SECTION C

===== THE END =====

*Why did the network admin go broke?
Too many connections, not enough bandwidth!*