

BRAC UNIVERSITY
Department of Computer Science and Engineering

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

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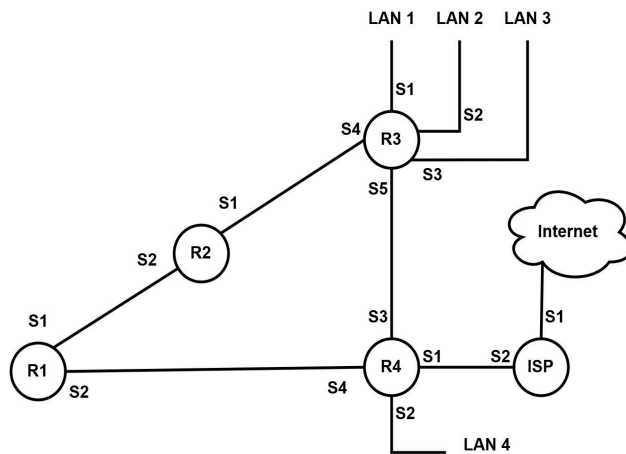
SECTION A [All questions of this section are MANDATORY] - 40 MARKS

Q1 [CO3]	The broadcast address of a network is 42.1.63.255 which can support 16382 hosts at max. I. Identify the subnet mask of the above network II. Identify the network address of the above network III. The network now wants to subnet its main network for better management. The requirements of the LANs are given as: LAN A - 2000 Hosts , LAN B - 1022 Hosts , LAN C - 512 Hosts and two WAN links . Apply VLSM to identify the network addresses of the sub-networks efficiently.	3 + 3 + 10
Q2 [CO2]	A medium-sized company of 100+ employees has a network with the following setup: <ul style="list-style-type: none"> • All internal devices use private IP addresses in the range 192.168.50.0/24. • Their ISP has allocated the company a pool of 5 public IP addresses (198.51.100.1 to 198.51.100.5). • All employees can access the internet simultaneously. I. Is this setup using NAT or PAT? Explain your reasoning by identifying the key indicators in the scenario. II. The three directors are complaining that their speed is slower during office time. Discuss what setup you would need to change to allow the directors to use the internet without sacrificing their speed.	5 + 5
Q3 [CO3] [CO3] [CO3] [CO2] [CO2]	An IPv4 packet is received at the end of the link with header parameters set as: <i>Version = 4, IHL = 5, TOS = 0, Total Length = 5086, Identification = 5656, DF = 0, MF = 0, Fragmentation Offset = 0, TTL = 45, Protocol = 17</i> The router that received the packet identified that 1244 Bytes is the maximum packet size that can be successfully sent via the link. [IPv4 header is 20 bytes in length] I. Identify the number of fragments that will be created. II. Calculate the fragment size of the last packet. III. Identify the fragment offset of the 5th fragment if the initial byte number was set to 0. IV. Explain the significance of the Identification field. V. Find out what the router would do if the DF was 1.	3 + 3 + 3 + 3 + 2

END OF SECTION A

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

Q4



Given the following topology where R1-R4 denote routers and the respective IP table of the topology.

- I. **Configure a recursive static route** in the **R4** router to reach **LAN 1** with AD 2
- II. **Configure the back-up route** of the above static route configured in **R4**, but this time using exit interface.

Device	Interface	IP	Network
R1	S1	.101	192.168.10.100/30
	S2	.225	192.168.11.224/30
R2	S1	.193	192.168.12.192/30
	S2	.102	192.168.10.100/30
R3	S1	.1	192.168.96.0/24
	S2	.1	192.168.64.0/25
	S3	.1	192.168.80.0/26
	S4	.194	192.168.12.192/30
	S5	.97	192.168.10.96/30
R4	S1	.1	192.168.9.0/30
	S2	.1	192.168.72.0/27
	S3	.98	192.168.10.96/30
	S4	.226	192.168.11.224/30
ISP	S1	.1	210.1.1.0/24
	S2	.2	192.168.9.0/30

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- Q5** Referring to the **Q4's** topology, **R1, R2 and R3** are running Link State protocol and **R1,R4 and the ISP router** are running Distance Vector Protocol. **Determine** which routers will send hello packets and **why**. Also, **state** which routers will periodically send routing updates and why it is inefficient.

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- Q6** Write the expanded version of the following IPv6 addresses:

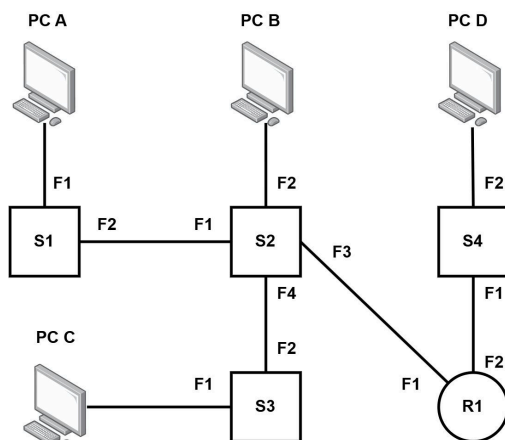
- I. fe80::1c35:67ab:3f9c:d81e
- II. 2607:0:0:805::
- III. fd00:abc:1234:5678::1

6

END OF SECTION B

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

Q7



Refer to the figure, **PC A** sends an ARP requests for **PC B**.

- I. **State the source and destination MAC** addresses in the ARP request packet.
- II. **Explain** how **PC B** knows that it has to reply.
- III. **State** what will router **R1** do with the packet and **why**.

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Q8	<p>A network administrator configures a new subnet physically distant from the main office's DHCP server. Clients of the new subnet complain that they are not receiving IP addresses via DHCP.</p> <p>I. State what the problem might be in the case above.</p> <p>II. State two solutions for the problem identified.</p>	3 + 3
Q9	<p>A customer support agent at an ISP receives a call from a client who is unable to access a critical business application hosted externally. The client's network appears to be fine when accessing other internet services. Identify which diagnostic tool the agent should use to pinpoint where the connectivity issue to the business application is occurring. Explain what specific information the tool provides that will help identify the exact location of the problem.</p>	6
Q10	<p>A university's IT department is integrating IPv6 into its existing network. The university currently supports a large number of IPv4-only educational resources and systems. The university has external collaborations that already use IPv6. Identify and briefly explain which transition technique will ensure seamless connectivity between the IPv4 and IPv6 internal networks.</p>	6
Q11	<div data-bbox="276 840 779 1281"> </div> <p>Refer to the figure given, PC B sends a packet to PC C, at this stage all switch tables contain information about all devices shown.</p> <p>I. State the actions that the switch S1 will take after it receives that packet.</p> <p>II. Explain, using the above scenario, why we call switches to be transparent.</p>	4 + 2

END OF SECTION C

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

*Why did the firewall feel lonely?
It got tired of blocking everyone out.*