B

# BRAC UNIVERSITY
## Department of Computer Science and Engineering

Examination : Semester Final | Semester: **Fall 2024**
Duration: **2 Hours** | 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.

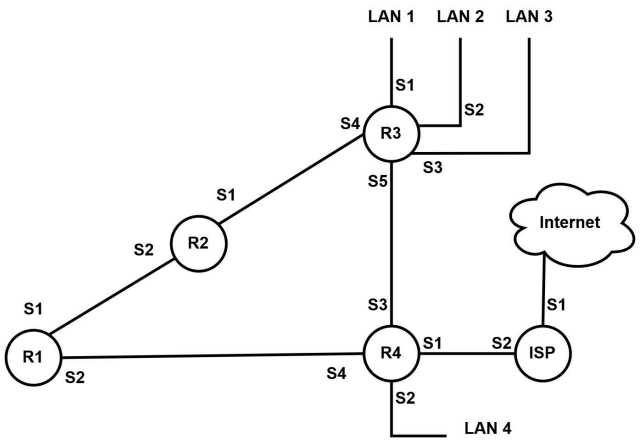
| **Name:** | **ID:** | **Section:** |
|---|---|---|

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

| | | |
|---|---|---|
| **Q1** **[CO3]** | A random host address of a network is **32.99.125.255/17**.<br>**I.** **Calculate** the total number of hosts the above network can support.<br>**II.** **Identify** the broadcast address of the above network.<br>**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 - **1024 Hosts**, LAN C - **3 Hosts** and **two WAN links**. **Apply** VLSM efficiently to identify the network addresses of the sub-networks. | **3** + **3** + **10** |
| **Q2** **[CO2]** | A small business runs a private network using IP addresses using **10.0.0.0/24.**<br>● The company has one public IP address assigned by their ISP: **203.0.113.10**.<br>● The business hosts an internal file server at **10.0.0.50** that needs to be accessible from outside the network on port **21 (FTP)**.<br>● Employees can also browse the internet simultaneously from their devices.<br>**I.** **Identify** which feature of NAT must be configured to allow external users to initiate access to the internal file server via FTP using the public IP and port 21.<br>**II.** Is the network setup using NAT or PAT? **Explain** your reasoning. | **5** + **5** |
| **Q3** | An IPv4 packet is received at the end of the link with header parameters set as:<br>*Version = 4, IHL = 6, TOS = 0, Total Length = 6421, Identification = 5656, DF = 0, MF = 0, Fragmentation Offset = 0, TTL = 45, Protocol = 17*<br>The router that received the packet identified that **1624 Bytes** is the maximum data size that can be successfully sent via the link. [IPv4 header is **24 bytes** in length] | **3** + **3** + **3** + **3** + **2** |
| **[CO3]** | **I.** **Identify** the number of fragments that will be created. | |
| **[CO3]** | **II.** **Calculate** the data size of the last packet. | |
| **[CO3]** | **III.** **Identify** the fragment offset of the **last** fragment if the initial byte number was set to 0. | |
| **[CO2]** | **IV.** **Explain** how the packets are re-grouped back when the fragments reach the destination. | |
| **[CO2]** | **V.** **Find out** the significance of the MF flag. | |

**END OF SECTION A**

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

**Q4** 


| 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 |

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

**I.** **Configure** a **directly attached default** static route in **R2** with **AD = 10**.

**II.** **Configure** a **backup** route of the above default static route using the next hop IP address.

**3 + 3**

**Q5** Referring to the **Q4's** topology, **R1, R2 and R3** are running Distance Vector protocol and **R1,R4 and the ISP router** are running Link State Protocol. **Determine** which routers will converge faster and **why**. Also, **state** which routers will keep track of their neighbors and **how**.

**3 + 3**

**Q6** **Write** the shortened version of the following IPv6 addresses:

**I.** 2001:0db8:85a3:0000:0000:8a2e:0370:7334

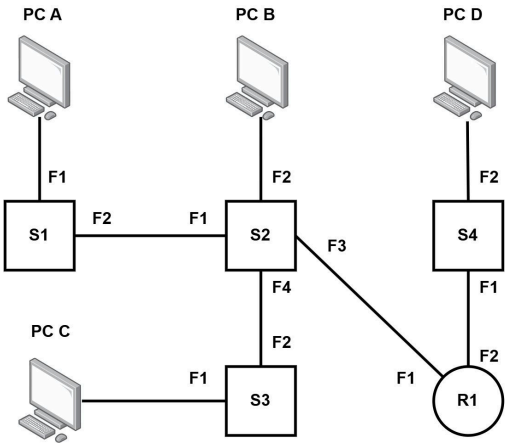
**II.** 2607:0000:0000:0805:0000:0000:0000:200e

**III.** 3ffe:1900:4545:1003:1200:a0f8:fe21:67cf

**6**

**END OF SECTION B**

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

**Q7** 

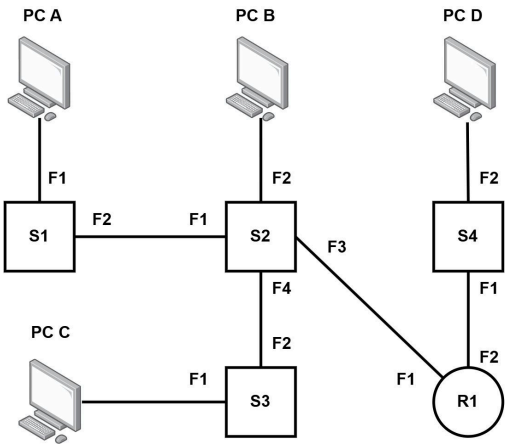

Refer to the figure, **PC A** sends an ARP requests for **PC D**.

**I.** **State** the **source** and **destination** MAC addresses in the ARP request packet.

**II.** **State** what will router **R1** do with the packet and **why**.

**III.** After receiving the ARP reply, **state** what is the first action made by **PC A**.

**2 + 2 + 2**

| | | |
|---|---|---|
| **Q8** | Consider a situation where someone is involved in malicious activities in our USIS system. The system administrator detected the source socket address associated with these actions. Despite this, they could not pinpoint the specific user due to the absence of end-to-end traceability. **Discuss** and **evaluate** the potential factors that could have contributed to the loss of this traceability. | **6** |
| **Q9** | In a DHCP-enabled network, each IP address is assigned to a device for a specific period, known as the lease time. Upon expiration of this lease, the device must renew its IP address to maintain network connectivity.<br>**I.** **List** the steps involved in the IP address **renewal** process with DHCP.<br>**II.** Additionally, **discuss** potential reasons a device might fail to renew its IP address. **Mention** which actions the device takes if it cannot renew the IP address. | **2 + 4** |
| **Q10** | **Explain** the function of the **loopback address** in network communications. Additionally, **provide** the loopback address used in IPv4 and IPv6. | **4 + 2** |
| **Q11** |  Refer to the figure given, **PC A** sends a packet to **PC C**, at this stage all switch tables contain information about all devices shown.<br>**I.** **State** the actions that the switch **S2** will take after it receives the packet.<br>**II.** **Explain**, using the above scenario, why we call switches to be self learning. | **4 + 2** |

**END OF SECTION C**

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

*Why did the computer network go to therapy?*
*It had too many unresolved IP issues.*