A

BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination : Semester Final | Semester: **Spring 2025**
Duration: **2 Hours** | Full Marks: **70**

CSE421 / EEE465 : Computer Networks

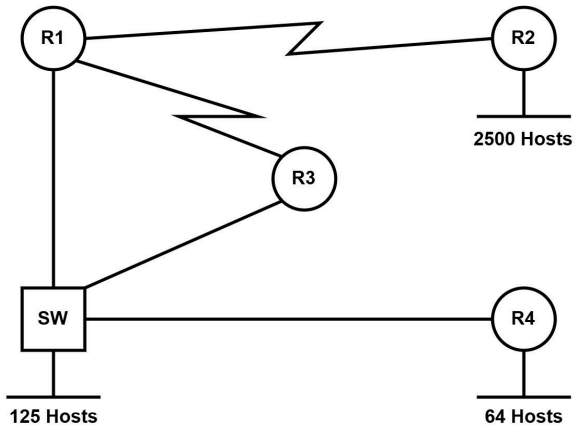
Answer **Sections A, B and C** as per instructions given. (**Pages: 3**)

Figures in the right margin indicate marks.

Name:	**ID:**	**Section:**

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

Q1 Your company gave you a broadcast address of 7.16.255.255/18. 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.** **3 + 10 + 2**

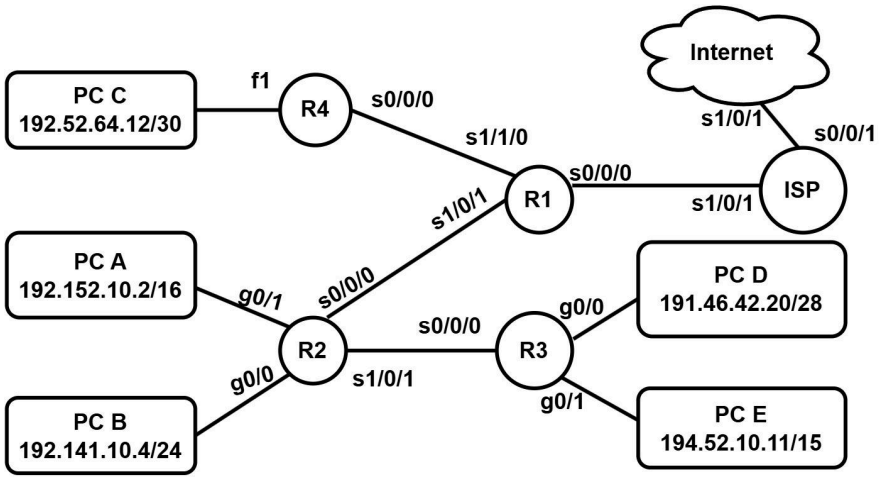


[CO3] **I.** **Find** the network address.

[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 that will be wasted for the R4 LAN.

Q2 **3 + 4 + 4 + 3 + 3**



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.** On R3, **identify** the networks that will be added to the table without any routing configuration.

[CO3] **II.** **Configure** a directly attached static route on R2 to reach R4 LAN with AD 50

[CO3] **III.** **Configure** a recursive route so that a S* entry is added in R1's routing table. **Identify** the significance of S*.

[CO2] **IV.** **Determine** the AD of a back up route for III .

[CO2]	**V.** R4 is discarding the packet whose destination IP is 172.42.10.4. **Deduce** the reason behind this.	
Q3	A packet of size **2584 bytes** including **32 bytes** of header was fragmented for transmitting in a link with MTU=**X bytes**. The **9th** packet has a size of **272 bytes.** It also has its MF bit set.	**2 + 3 + 3**
[CO3]	**I.** **Calculate** the value of X.	
[CO3]	**II.** **Calculate** the fragment offset for the 7th packet.	
[CO3]	**III.** **Find out** the total number of fragmented packets.	

END OF SECTION A

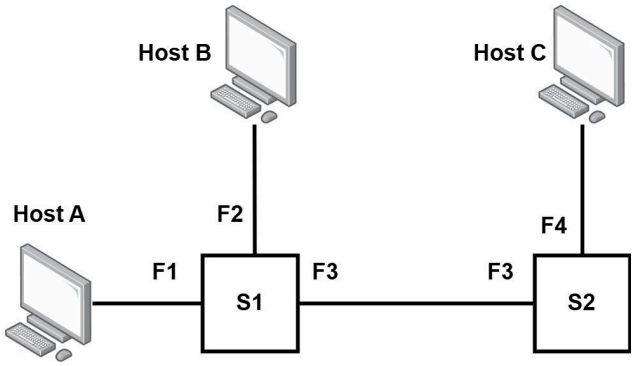
[CO3] **SECTION B** [Answer **ANY TWO out of THREE** in this section] **- 12 MARKS**

Q4	Refer to the topology given in **Q2**, all the routers are running **Distance Vector Routing** Algorithm. The routers are supposed to share their information with their neighbors. **Determine** how R2 will know about its neighbors to send its information. In the first iteration, **find out** what kind of information R2 will send.	**4 + 2**
Q5	**Apply** your knowledge of IPv6 address formatting to transform and **simplify** the following addresses into their shortest possible form according to IPv6 rules. Also, **identify** the type of address and **explain** in one sentence the purpose of that address type. **I.** 2001:0db8:12af:0000:0000:0000:0a20:0004 **II.** 0000:0000:0000:0000:0000:0000:0000:0001	**3 + 3**
Q6	A university lab computer can successfully ping another laptop in the same building, but it fails when trying to ping a server on the internet. **I.** **Give** two possible reasons why the computer cannot ping the internet server. **II.** Can a network admin use ICMP tools to determine whether the problem is inside or outside the campus network? **Explain** which ICMP tools are used to determine the external and internal issues.	**2 + 4**

END OF SECTION B

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

Q7	In the IPv4 header, the **Total Length** field is 16 bits, while the **Fragment Offset** field is only 13 bits. **I.** How does the 13-bit Fragment Offset represent the position of a fragment accurately without losing information? **II.** What is the purpose of the **Identification** field in fragmentation and reassembly?	**6**
Q8	When a PC connects to a DHCP-enabled network, it initially broadcasts a message to look for available DHCP servers. **I.** Why does the PC use a broadcast message instead of a unicast at this stage? **II.** What kind of information does the PC receive in response, and how does it reply?	**6**

Q9	A student project web server is hosted inside a university computer lab at private IP address **10.10.5.50**, listening on **port 8080**. The lab is connected to the internet via a router that uses **NAT** with a public IP address. When the student shares the public IP with a recruiter to view the project remotely, the recruiter reports that the link does not work. **I.** Why can't the recruiter access the server using the public IP address? **II.** What network configuration should be set up on the router to make the server accessible from outside the university?	**6**
Q10	IPv6 has a larger base header than IPv4 (40 bytes vs. 20 bytes), yet it is considered more efficient for modern networking. How does IPv6 improve processing compared to IPv4?	**6**
Q11	**Host A** (IP: 192.168.1.10, MAC: AA-AA-AA-AA-AA-AA), Host B (IP: 192.168.1.12, MAC: BB-BB-BB-BB-BB-BB) and Host C (IP: 192.168.1.20, MAC: CC-CC-CC-CC-CC-CC) are connected according to the topology on the side. Initially, all ARP and MAC tables are empty. Host A wants to send a message to Host C.  **I.** What kind of ARP packet (mention source and destination MAC address) will Host A generate, and how will the switches process it? **II.** Switches are termed "plug-and-play". Briefly explain the significance.	**6**

END OF SECTION C

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

Why did the network admin go broke?
Too many dropped packets.