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National University of Computer and Emerging Sciences, Lahore Campus

Assignment (In Class) .....4 [BCS: Section 5A] Fall 2024

Computer Networks (Code: CS3001) **Date: Oct 31, 2024**

Total Marks: 15 **Duration: 20 -Minutes**

Name ---------- Roll #-- ---------- .

Instructions: Attempt all questions on this sheet. You can make use of rough sheet (do not attach to this sheet).

Q1: Suppose there are four routers between a source host and a destination host. Ignoring fragmentation, an IP datagram sent from the source host to the destination host will travel over how many interfaces? How many forwarding tables will be indexed to move the datagram from the source to the destination? Give proper justification for each part. **[5 Marks] (CLO 3)**

Q2: This question consists of 4 parts. You will need to solve the part by considering the last digit of your student ID (Roll#) as follows: **[10 Marks] (CLO 3)**

- If the last digit of your ID is 0 or 9, then attempt Part A.
- If the last digit of your ID is 6 or 7, then attempt Part B.
- If the last digit of your ID is 1 2, or 8, then attempt Part C.
- If the last digit of your ID is 3, 4 or 5, then attempt Part D.

All 4 parts are based on the given block of IP addresses.

Part A: An organization is granted a block with one of the IP addresses as 150.100.80.0/20. The administrator wants to create 64 subnets of fixed length. You are required to find (i) the subnet mask to be configured in each subnet, (ii) 1st and last IP address in subnet 1, (iii) 20th and 50th IP address in subnet 50, (iv) number of addresses in each subnet, and (v) broadcast address in the last subnet.

Part B: An organization is granted a block with one of the IP addresses as 150.100.80.0/22. The administrator wants to create 4 subnets with the following requirements: 1st subnet needs at least 300 IP addresses, 2nd subnet needs at least 200 IP addresses, 3rd subnet needs at least 100 IP addresses while 4th subnet needs at least 120 IP addresses. You are required to find (i) the subnet mask for each subnet, (ii) 1st and last IP address in each subnet, (iii) number of addresses in each subnet, and (iv) range of valid host addresses in each subnet.

Part C: An organization is granted a block with one of the IP addresses as 90.10.80.0 having net mask as 255.255.248.0. The administrator wants to create 32 subnets of fixed length. You are required to find (i) the subnet mask to be configured in each subnet, (ii) 1st and last IP address in subnet 10, (iii) 20th and 50th IP address in subnet 20, (iv) number of addresses in each subnet, and (v) network address in the last subnet.

Part D: An organization is granted a block with one of the IP addresses as 100.100.80.0/23 having net mask as 255.255.254.0. The administrator wants to create 4 subnets with the following requirements: 1st subnet needs at least 220 IP addresses, 2nd subnet needs at least 110 IP addresses, 3rd subnet needs at least 55 IP addresses while 4th subnet needs at least 40 IP addresses. You are required to find (i) the subnet mask for each subnet, (ii) 1st and last IP address in each subnet, (iii) number of addresses in each subnet, and (iv) range of valid host addresses in each subnet.

Start writing your Answers to Q1 onward from here and then use backside of this sheet.

Q1) 10 interfaces will be used as 1 interface for each dest and src. Moreover, 2 interfaces per router so: 2(4) + 2(1) = 10

- 4 forwarding tables will be indexed, 1 for each of the router

Q2) 150.100.80.0/22

10010110.01100100.01010000.00000000

A: 0 ($2^9 = 512$)

B: 1 → 10 ($2^8 = 256$)

C: 11 → 110 ($2^7 = 128$)

D: 111 ($2^7 = 128$)

i) subnet masks:

A: 255.255.254.0

B: 255.255.255.0

C: 255.255.255.128

D: 255.255.255.128

ii) first and last IP:

	first	last
A:	150.100.80.0	150.100.81.255
B:	150.100.82.0	150.100.82.255
C:	150.100.83.0	150.100.83.127
D:	150.100.83.128	150.100.83.255

iii) no. of addresses:

A: $2^9 = 512$

B: $2^8 = 256$

C: $2^7 = 128$

D: $2^7 = 128$

iv) range of valid host addresses.

	first	end
A:	150.100.80.1	150.100.81.254
B:	150.100.82.1	150.100.82.254
C:	150.100.83.1	150.100.83.126
D:	150.100.83.129	150.100.83.254