**A**

# BRAC UNIVERSITY
## Department of Computer Science and Engineering

Examination : Semester Final
Duration: 2 Hour 15 Minutes

Semester: Summer 2022
Full Marks: 100

CSE421 / EEE465 : Computer Networks

Answer **ANY FIVE** out of the following **SIX** questions. (**Pages: 4**)

Figures in the right margin indicate marks.

| **Name:** | **ID:** | **Section:** |
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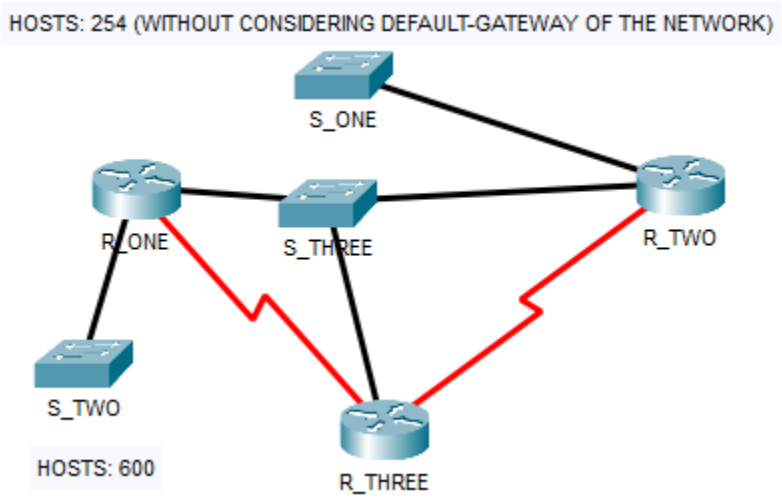
| **Q 1. a) CO3** | The "ipconfig" command generates the following output.<br>`Ethernet adapter Ethernet 2:`<br>`  Connection-specific DNS Suffix  . :`<br>`  Link-local IPv6 Address . . . . . : fe80::af89:abba:af0f:47cc/64`<br>`  IPv4 Address. . . . . : 19.96.99.49`<br>`  Prefix Mask . . . . . : 10`<br>`  Default Gateway . . . . . : 19.96.99.50`<br>From the above output, **determine** the following (show necessary calculations):<br>I. The network address.<br>II. The subnet mask.<br>III. Number of hosts possible to support in this subnet. | **3 + 1 + 2** |
| **b)** | Using the network address found in 1 (a), efficiently **calculate** the required sub-network addresses of all the networks in the following topology *(Figure 01)*. Show necessary calculations and the hierarchical tree of network addresses.<br>  <br>**Figure 01 : VLSM Topology** | **14** |
| **Q 2. a) CO3** | **Identify** how in traceroute, the origin device knows how to stop incrementing the TTL value and keep on sending the ICMP packets. | **4** |
| **b)** | Briefly **describe**, how is the fragment offset value is calculated in an IPv4 Header? | **4** |
| **c)** | You have a web server installed in your local network, having the IP address of | **4** |

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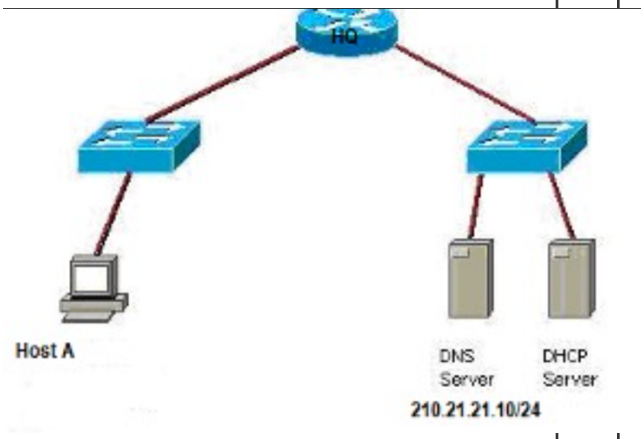
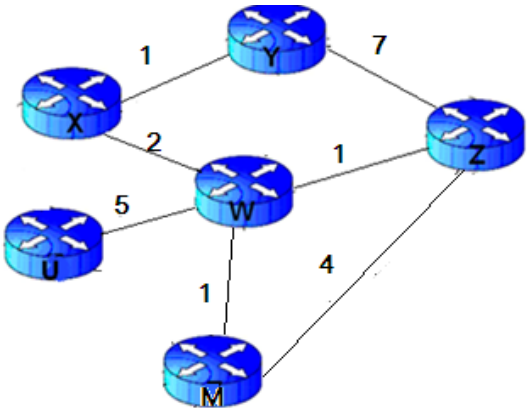
| | 192.168.10.10/24. Your network uses a single public IP address of 210.21.21.10/24. Now no one is able to access your server from outside, **examine** why? | |
| **d)** | <output omitted><br>ip dhcp excluded-address 200.21.21.10 200.21.21.9<br>ip dhcp excluded-address 200.21.21.253<br><br>ip dhcp pool SALESNetwork<br>network 200.20.21.0 255.255.255.0<br>default-router 200.21.21.254<br>dns-server 200.21.21.10<br>!<br>interface FastEthernet 0/0<br>ip address 200.21.21.253 255.255.255.0<br>duplex auto<br>speed auto<br>!<br><output omitted><br>  <br>**Figure 02 : DHCPv4 Command and Network Topology**<br>I. Refer to the figure *(Figure 02)* above. Router HQ is configured as the DHCP server for the network where Host A is connected, as shown. Host is facing several problems. **Identify** the problem/s and provide the solution/s.<br>II. **Specify** how would the DHCP server know if you leave the network very early compared to your total lease time of the IP address you leased? | **6 + 2** |
| **Q 3. a) CO3** | Distance Vector algorithm does not keep track of their neighbors, why not? **Explain** how it will know that the neighbor is up or not? | **6** |
| **b)** | In the Link state algorithm, changes in route do not create so much traffic and less problem as in Distance Vector. **Explain** why not for the two items. | **6** |
| **c)** |  <br>**Node Tables**<br>X: 0 1 ∞ 2 ∞ ∞<br>Y: 1 0 7 ∞ ∞ ∞<br>Z: ∞ 7 0 1 ∞ 4<br>W: 2 ∞ 1 0 ∞ 1<br>U: ∞ ∞ ∞ 5 ∞ ∞<br>M: ∞ ∞ 4 1 ∞ ∞<br>**Figure 03 : Dynamic Routing Algorithm**<br>For the above figure above, the table represents the routing tables of all nodes initially. Router z receives updates from w and y only. All routers are running the Distance Vector algorithm. **Show** the updated table of router z after getting the updates once. (Use Dx(y) = min{c(x,y) + Dy(y), c(x,z) + Dz(y)} for explaining your answer). | **8** |

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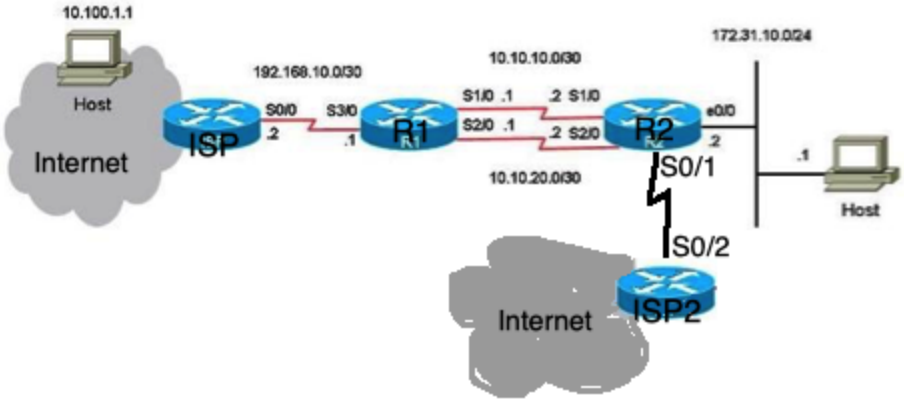
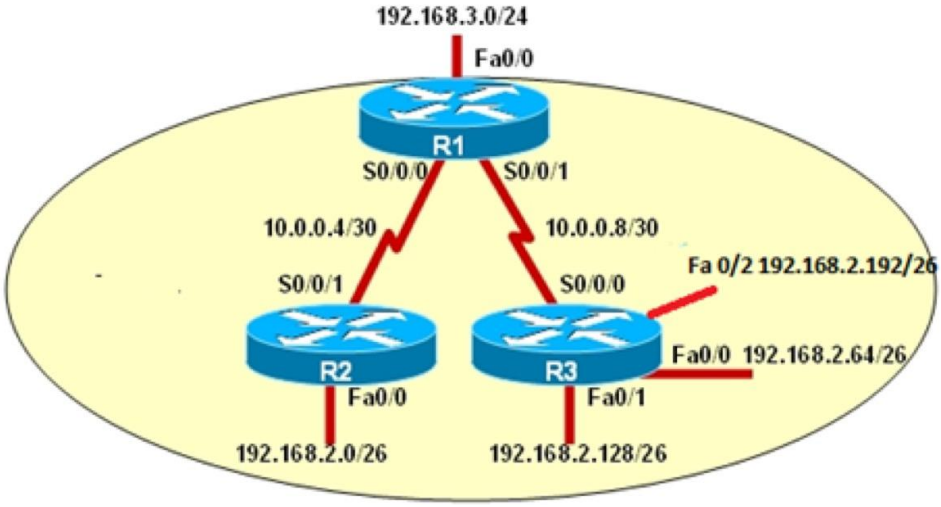
| **Q 4. a) CO3** |  <br>**Figure 04 : Network Topology**<br>I. Refer to the topology in figure above**.** You need to configure a default static route for the router R1 and R2. Using the command below, **create** the default static routes needed.<br>**`ip route`** _____ _____ _____<br>II. To create two floating default static routes in router R2, **identify** what modifications needed to be done to the above command? | **4 + 4** |
| **b)** | **Describe** what is the purpose of keeping the AD of a static route to 1 and the cost to 0? Is the AD of the static route always 1? | **6** |
| **c)** |  <br>**Figure 05 : Route Summarization**<br>If you create a summarized static route in R1 for all the networks attached with R2 and R3, **state** if will it be a problem? Explain what and how to solve it. | **6** |
| **Q 5. a) CO3** | A new submarine line has been laid out between Bangladesh and Nepal via India. You, being a Bangladeshi, would like to communicate with a friend of yours living in Nepal, both using the IPv4 addresses. However, India has advanced to using IPv6. **Identify** if this will cause any issues? If yes, how can you solve it? | **5** |
| **b)** | **Shorten** the following IPv6 addresses: FF10:0000:0000:0000:AC19:0000:1000:E000 | **4** |
| **c)** | **State** the fully shortened Global Unicast address for the PC with MAC is | **5** |

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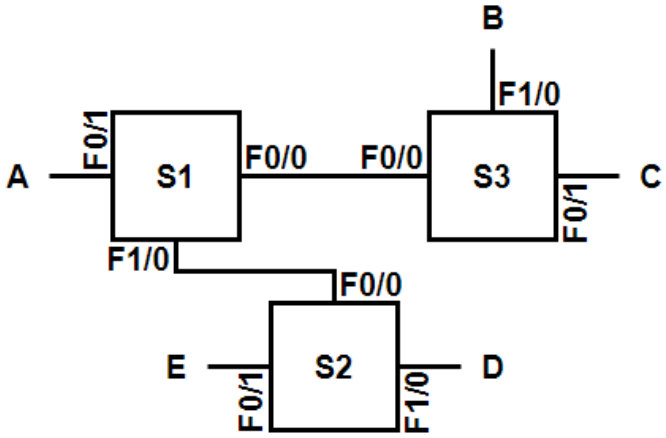
| | F0-B2-F0-EA-DF-35 with subnet ID of (0010)h using EUI64. | |
| **d)** | I. In Stateless DHCPv6, having a DHCPv6 server only to assign IPs dynamically is enough in an IPv6 network setup". Is the statement true or false? **Justify**.<br>II. In SLAAC, the device creates its own address randomly. **Specify** how the device will know that the address created is not being used by another device? | **3 + 3** |
| **Q 6. a) CO4** | Is it possible to know the MAC address of a device located in another network using ARP? If your answer is 'yes', **explain** how. If your answer is 'no', **explain** why. | **4** |
| |  <br>**Figure 06 : Switch Topology** | |
| **b)** | Given, all the switches were just turned on in the above figure (Figure 06):<br>I. **Show** the states of the MAC tables of S1, S2 and S3 after just turning them on?<br>II. Host A pings Host D and gets a successful reply. **Show** the state of the MAC table of S1 right after the successful ping? | **2 + 4** |
| **c)** | Given a MAC address EE:A9:B8:C7:D6:E5.<br>I. **Identify** if the above MAC address is a unicast or multicast address?<br>II. **Identify** Which part of the above MAC address is the OUI?<br>III. **State** changing which bit of the above MAC address will act as the indicator if it's a locally administered address? | **2 + 2 + 3** |
| **d)** | **Specify** what does NIC mean? Identify where is it located? | **3** |