| **A** | **BRAC UNIVERSITY**  **Department of Computer Science and Engineering** |  |
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| Examination : Semester Final  Semester: Summer 2022  Duration: 2 Hour 15 Minutes  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.  **Ethernet adapter Ethernet 2:**  **Connection-specific DNS Suffix . :**  **Link-local IPv6 Address . . . . . : fe80::af89:abba:af0f:47cc/64 IPv4 Address. . . . . . . . . . . : 19.96.99.49**  **Prefix Mask . . . . . . . . . . . : 10**  **Default Gateway . . . . . . . . . : 19.96.99.50**  From the above output, **determine** the following (show necessary calculations): I. The network address.  II. The subnet mask.  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.    **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** |

**1**

|  | 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)** | **Figure 02 : DHCPv4 Command and Network Topology**  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.  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)** | **Figure 03 : Dynamic Routing Algorithm**  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** | **Figure 04 : Network Topology** 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.  **ip route \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  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)** | **Figure 05 : Route Summarization**  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** |

**3**

|  | 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**. 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** |
| **b)** | **Figure 06 : Switch Topology**  Given, all the switches were just turned on in the above figure (Figure 06): I. **Show** the states of the MAC tables of S1, S2 and S3 after just turning them on? 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.  I. **Identify** if the above MAC address is a unicast or multicast address? II. **Identify** Which part of the above MAC address is the OUI?  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** |

**4**