Part I. Short answer questions. Select five questions from eight questions including two mandatory questions. **(5 pts. each)**

1. What is a network reference model? State the layers found in both OSI and TCP/IP protocol stacks. Why some layers are not found in TCP/IP protocol stack?
2. State the similarities and differences between MAC protocols for wired and wireless LANs.
3. Write at least two protocols used in WAN. State the working principles of the protocols. Justify your answer with supported examples.
4. One of a challenge in BGP dynamic routing algorithm is the issue of AS. Why AS becomes a challenge in the process of BGP configurations in the routers?
5. List the design goals of a routing algorithms. Compare and contrast distance vector and link state routing algorithms with this design goals.
6. State the similarities and difference in between RIP (Routing Information Protocol) and OSPF (Open Shortest Path First) routing algorithms.
7. Suppose a Junior Software Engineer in AB^{+} Software Development Company develop an application software runs on UDP. However, the performance and reliability of the application software is not as expected by the company. As a network student what is the main cause of this problem? How do you fix this problem in the software? ***Note:*** ***the product doesn't have any software related performance issue identified at the period of software testing.*** **(Mandatory)**
8. Suppose the router runs two dynamic routing algorithms. The first algorithm preference value is greater than the second one. The first algorithm consider number hopes to select a best path for routing packets from source to destination. However, the second algorithm considers different parameters like bandwidth, packet loss, congestion and number of hopes to select the best path for routing a packet from source to destination. Therefore, which routing algorithms table can be selected by the router as a routing table to forward packet in the router? Why? **(Mandatory)**

(5%)

Bonus

1. Suppose you are employed in XYZ Trading PLC as a junior network administrator position. The company have approximately 200 employees that required a reliable internet service to conduct their day-to-day business transactions. The company manager ordered you to design a network to the company by considering both financial and technical consideration of a devices used in the proposed network. As you know Layer-2 switches are much more expensive than hubs. So, as a junior network administrator which networking devices are selected by you in the proposed design. Why you are selecting those devices?

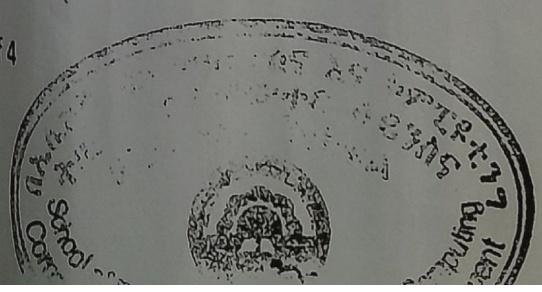
Adama University
Adama, Ethiopia

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DEPT/SEC ECE 1

Part I. Short answer questions. **(Answer only five questions including Mandatories: 4 pts. each)**

1. Suppose the car manufacturing company has few sole-distributors in different countries throughout the entire globe. In order to disseminate update information about new models/products to its sole-distributors; what kind of multicast routing protocol is most suitable for the company? Why? **(Mandatory)**
2. Assume the company required to establish a VPN technology to secure its communication between the head quarter and branch offices. The company uses IPv6 addressing scheme for its system in the company network. However, the telecom company uses IPv4 addressing scheme for its entire infrastructure. Therefore, as a networking student, what kind of VPN technology/ies is/are the most suitable VPN technology for the company? Why? **(Mandatory)**
3. Suppose you are working as a Junior Network Administrator in the telecom company that uses MPLS for data forwarding services throughout the entire telecom infrastructure. Therefore, as a Junior Network Administrator, what kind of congestion control strategy in the network layer best fitted for the company? Why?
4. State the differences and similarities in between IP routing with MPLS forwarding technologies.
5. Calculate the multicast MAC address of the following two multicast IP for the given two multicast groups:
   a. 232.222.45.107
   b. 238.94.45.107
6. Assume one student from freshman program eager to checking new features of an operating system launched by Canonical Inc. (Ubuntu 22.10). The student required your suggestion about virtualization approach that can be a best suited for the test. As an



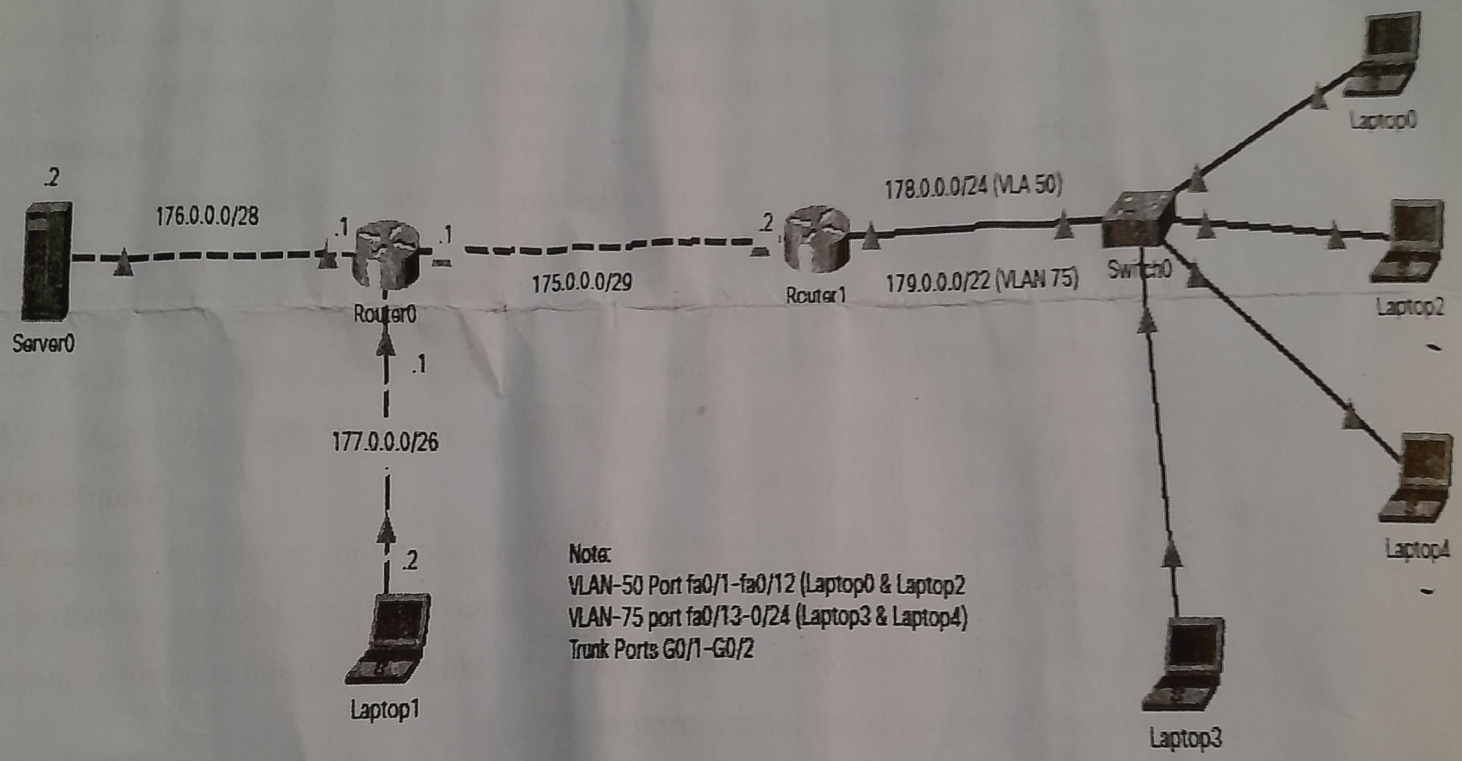
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advanced networking student, which implementation approach is best for the student? Why?

7. The company purchase latest Cisco switches to expand its ICT infrastructure. These new products of Cisco support SDN technology. However, the existing networking devices in the company network don't support SDN technology. Therefore, as a networking student, how the company utilize these new networking devices in the company network?

8. State the similarities and differences in between L2TP and SSL in creating a VPN for network users.

Part III. Laboratory questions **(4 pts. Each)**



1. Consider the above network diagram to answer the questions given below. ***(Answer only three questions)***

   a. Suppose the system administrator on **Router1** deny two clients (Lapto2 & Laptop4) from accessing data from the server machine. Write appropriate access-list configuration on the required Router to implement the policy.

   b. Write a CISCO command to configure an EIGRP routing protocol on **Router1** to ping successfully to the devices found on **Router0.**

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c. Write a Cisco commands to configure VLANs on the switch based on the detail information given on the network diagram.

d. Write a Cisco commands to configure a router-on-stick configuration to support inter-VLAN communication on Router1.

e. Write a Cisco commands to configure DHCP using a DHCP-Server (Server0). Write all activities you can do in the server as well as required commands on the given routers.

f. Write a Cisco commands to configure Router1 as a DHCP-server for its connected hosts in VLAN 50 and VLAN 75.

2. Suppose the system administrator configure three routers (R1, R2 and R3) using an HSRP to create a reliable service to its clients. Assume the system administrator wants to make R2 as an active router for the service. How the system administrator meets this requirement? Write a Cisco commands the admin configured in the routers to fulfill the need. ***(Mandatory)***

3. Suppose the network administrator configure the router interface with the given IP address. However, the network administrator faces the challenge shown below. Therefore, as a networking student, what is the main cause of this problem in the given router? How you can fix it? ***(Mandatory)***

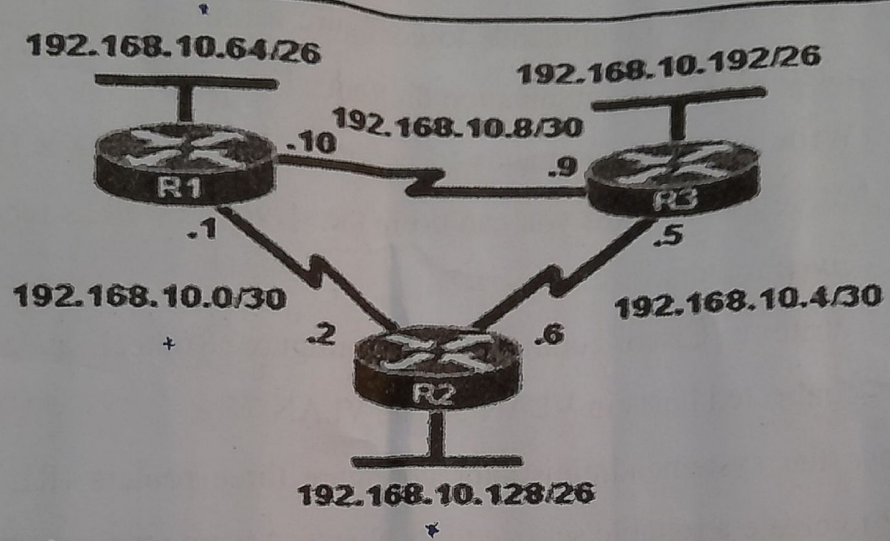
Router(config)#interface GigabitEthernet 1/0/1

Router(config-if)#ip address 192.168.16.143 255.255.255.240

Bad mask /28 for address 192.168.16.143

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Bonus (5 pts.)




```
R3# show ip route
Gateway of last resort is not set
     192.168.10.0/24 is variably subnetted, 6 subnets, 2 masks
D       192.168.10.64/26 [90/2195456] via 192.168.10.9, 00:03:31, Serial0/0
D       192.168.10.0/30 [90/2681856] via 192.168.10.9, 00:03:31, Serial0/0
                        [90/2681856] via 192.168.10.5, 00:03:31, Serial0/1
C       192.168.10.4/30 is directly connected, Serial 0/1
C       192.168.10.8/30 is directly connected, Serial 0/0
C       192.168.10.192/26 is directly connected, FastEthernet0/0
```

1. Refer to the exhibit. A network engineer displays the IP routing table on R3 and gets the above output (i.e., by using a show IP route command). Is there any problem in configuring the routers? When your answer is **yes**, what is the problem and resolve the problem by writing a required Cisco command on appropriate router?

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