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Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Computer Systems & Network Engineering

Final Examination
Year 2, Semester 2 (2022)

IE2040 – Advanced Internetworking

Duration: 2 Hours

November 2022

Instructions to Candidates:

- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 7 pages, including the cover page.
- Calculators are allowed but, electronic devices capable of storing and retrieving text are not allowed.

Question 1 (25 marks)

a. List the 4 main functions of a dynamic routing protocol. (2 marks)

b. Identify the functions of routing protocol. (3 marks)

c. Consider the network topology shown below in figure 1. The topology consists of multiple routers interconnected by full-duplex links. Each link has a static cost associated with it, which represents the cost of sending data over that link. For example, the link from B to F has a cost of 6. All of the links are symmetric (i.e. the cost is the same in both directions, such as between B and F).

(10 marks)

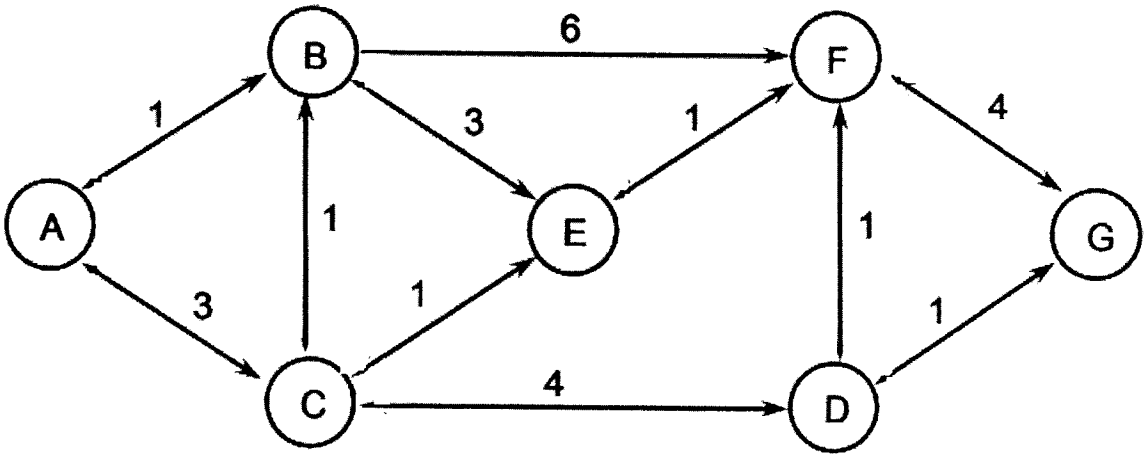

Figure 1: Topology 1

i. Find the shortest path between every pair of nodes using Bellman-Ford's distributed algorithm.

d. Using the Dijkstra Algorithm find the shortest paths from the source to all vertices in the given graph.

(10 marks)

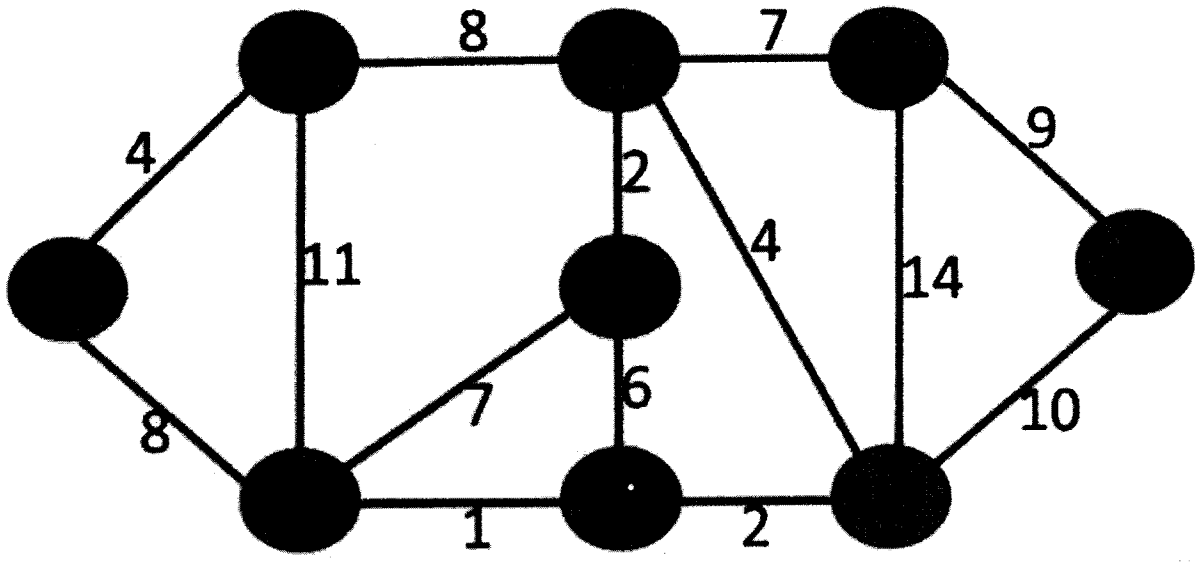

Figure 2 : Topology 2

Question 2 25 marks)

a. Ethernet switches compute a spanning tree using the spanning tree protocol. (5 marks)
   i. Explain briefly how the spanning tree protocol works.

b. In figure 3, three switches are connected with each other. (10 marks)

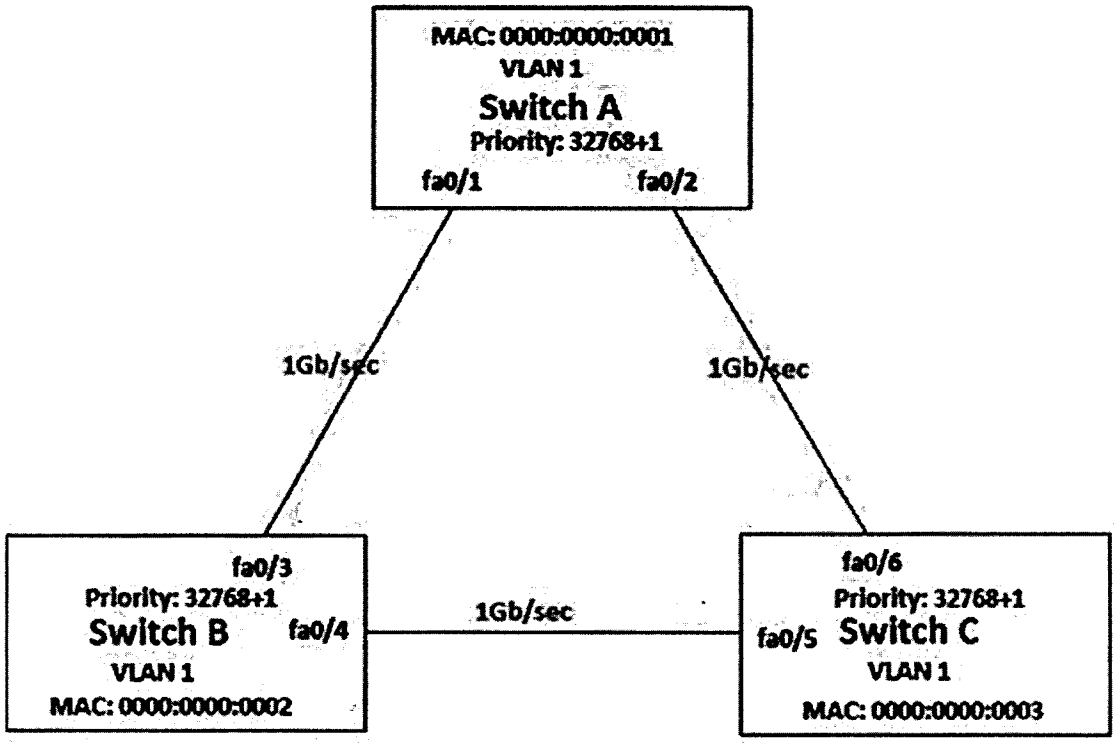

Figure 3: Topology 3

i. Identify the root switch. Justify your selection.
ii. Indicate the root ports.
iii. Indicate the designated ports and blocked ports.

c. A problem with network connectivity has been observed in Figure 4. It is suspected that the cable connected to switch port Fa0/9 on Switch1 is disconnected. What would be the impact of this cable being disconnected?

(5 marks)

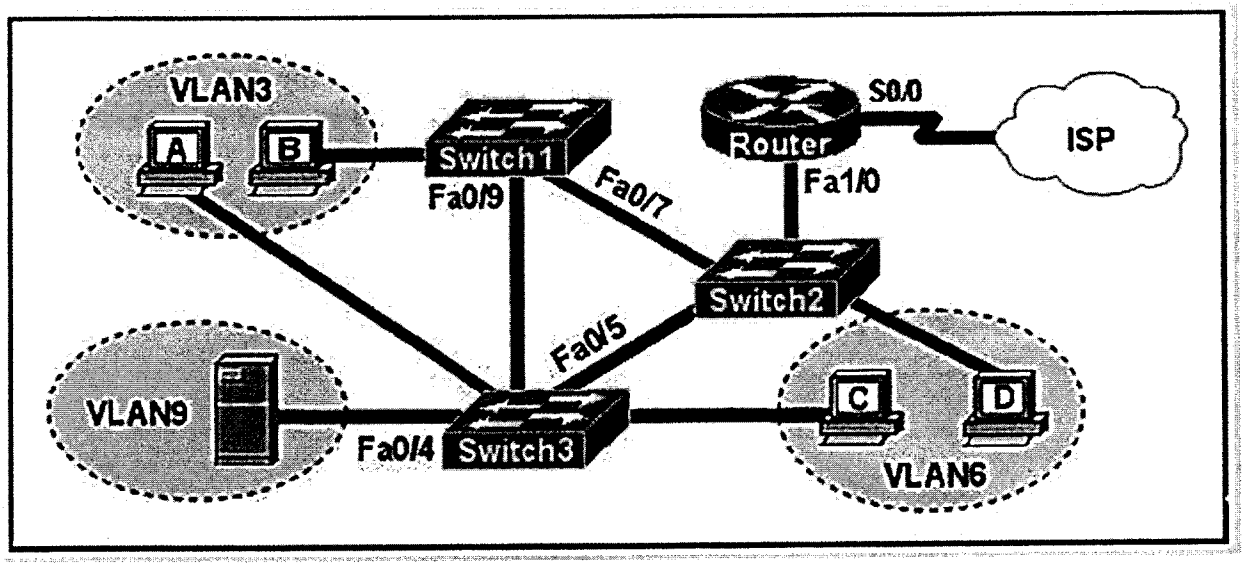

Figure 4 :Topology 4

d. Explain how you improve network performance by increasing the bandwidth available to hosts and limit the size of the broadcast domains.
(5 marks)

Question 3 (25 marks)

a. List three advantages of using EtherChannel technology. (5 marks)
b. A network administrator is configuring an EtherChannel link between two physical ports on a switch. What will happened if one of the physical ports fails? (5 marks)
c. What will happen if a network administrator puts a port that is part of an EtherChannel bundle into a different VLAN than the other ports in that bundle? (5 marks)

d. Refer figure 5. The network below is configured with OSPF protocol. Router A could not form an adjacency with router B, what is the possible cause? (5 marks)

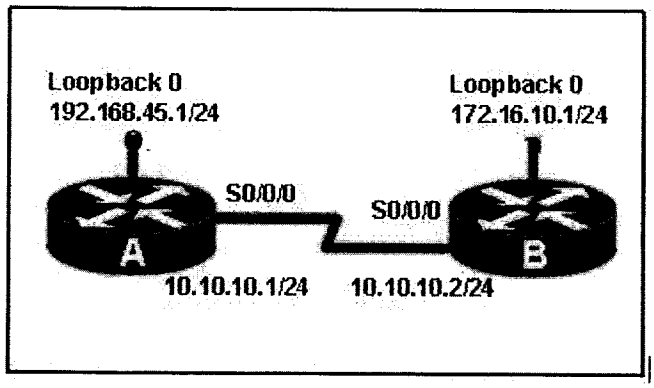

Figure 5: Topology 5

e. Which protocol advertises a virtual IP address to facilitate transparent failover of a Cisco routing device? (5 marks)

Question 4 (25 marks)

a. How a hierarchical network model is used to design networks of an organization? (2 marks)

b. Which layer of the hierarchical design model provides a means of connecting devices to the network and controlling devices are allowed to communicate on the network? (3 marks)

c. The following topology in Figure 6 has used the Class B address 172.30.0.0/16 to address its organization. The western region of the organization has been allocated the 172.30.32.0/20 block. As the administrator of the Phoenix office (HQ), you are required to allocate valid subnets to the HQ and three branch offices. Compute the subnets that should be assigned to each office.

(10 marks)

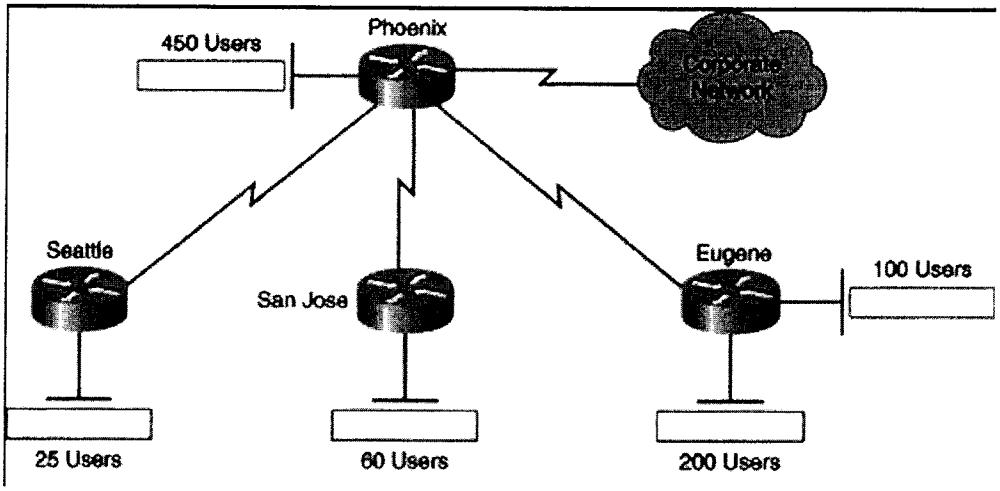

Figure 6: Topology 6

d. What are three parts of an IPv6 global unicast address? (5 marks)
e. What is the subnet address for the IPv6 address 2001:D12:AA04:B5::1/64? (3 marks)
f. What is the most compressed representation of the IPv6 address 2001:0000:0000:abcd:0000:0000:0000:0001? (2 marks)

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