OXFORD BROOKES UNIVERSITY

MCEL5002 Network Technologies

07 April 2020

10:00 - 12:00

2 Hours

Student Materials Not Permitted

Do not turn over or open the examination paper until the beginning of the examination is announced

This examination paper must not be removed from the examination room.

The paper will remain confidential

MCEL5002 Network Technologies

Examination Rubric

Examination length: **2 hours**.

There are two parts, **Part A** and **Part B**.

Part A contains 32 multiple choice questions.

On the Multiple Choice Answer Sheet, complete the following:

Complete your surname and initials in the main box

Complete your Student Number in the box labelled Candidate Number

Write the module title (Network Technologies) in the box specified 'Module Title' at the bottom of the Answer Sheet.

Leave blank the Module Number box on the lower right hand side.

Answer **all** questions in Part A on the multiple choice answer sheet provided.

There are 2 marks for each correct answer. Zero marks will be awarded for any question for which more than one answer is given. There is no negative marking.

Part B contains 4 written questions.

Answer any **three** questions from part B.

Answer using the answer booklet provided.

Each question carries the same number of marks.

The question paper is not to be removed from the Examination Room.

Examination Questions

Part A

Answer all questions

1. What is the term that is used for the area of a network that is affected when a device or network service experiences problems?

   A. Failure domain

   B. Collision domain

   C. Broadcast domain

   D. User domain

2. A 48 port gigabit switch supports a forwarding rate of 32 Gb/s, what is the maximum wire speed for each port on this switch?

   A. 48 Gb/s

   B. 32 Gb/s

   C. 16 Gb/s

   D. 1 Gb/s

3. What is the purpose of the vlan.dat file on a switch?

   A. It holds the running configuration.

   B. It holds the saved configuration.

   C. It holds the VLAN database.

   D. It holds the operating system.

4. Which of the following statements about VTP is **not** correct?

   A. Summary advertisements include the VTP domain name.

   B. An advertisement request is sent to ask for the subset advertisement message.

   C. Subset advertisements include the VTP revision number.

   D. Subset advertisements include VLAN information.

5. Which VTP mode should be used to configure an extended VLAN?

   A. VTP server.

   B. VTP management.

   C. VTP client.

   D. VTP transparent.

6. If two switches, Switch A and Switch B, are connected, which one of the following configurations will **not** give trunk mode operation?

   A. Switch A: Dynamic auto. Switch B: Dynamic auto.

   B. Switch A: Dynamic desirable. Switch B: Dynamic auto.

   C. Switch A: Dynamic desirable. Switch B: Dynamic desirable.

   D. Switch A: Dynamic Auto. Switch B: Permanent trunking mode.

   E. Switch A: Permanent trunking mode. Switch B: Permanent trunking mode.

7. What is the function of STP in a scalable network?

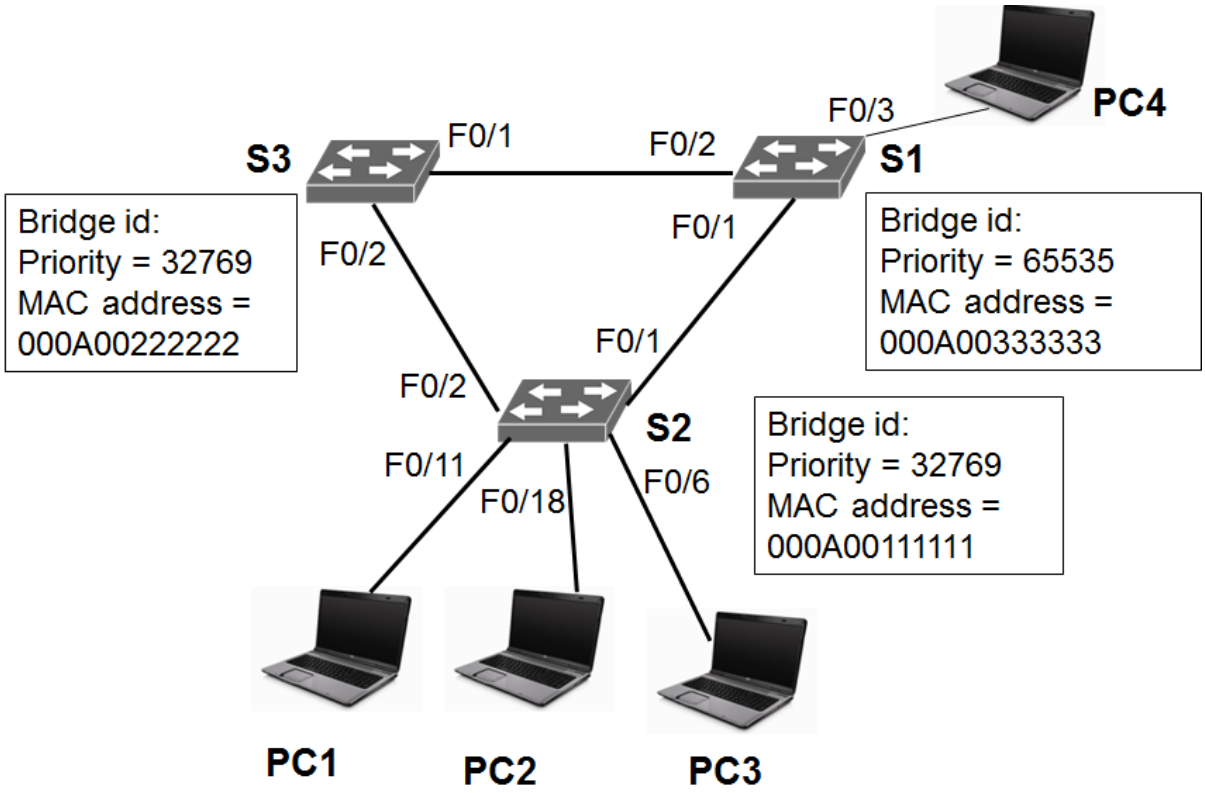
   A. It decreases the size of the failure domain to contain the impact of failures.

   B. It protects the edge of the enterprise network from malicious activity.

   C. It disables paths to eliminate Layer2 loops.

   D. It combines multiple switch trunk links to act as one logical link for increased bandwidth.

8. In the figure below, which switch will be elected Root Bridge and why?



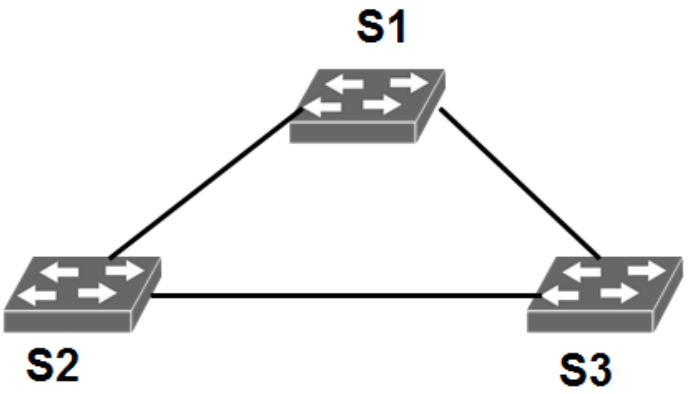
   A. Switch S1, because it has the highest Priority.

   B. Switch S1, because it has the highest MAC address.

   C. Switch S2, because it has the lowest priority and MAC address combination.

   D. Switch S3, because it has the fastest interfaces.

9. A network administrator is configuring PVST+ for the three switches. What will be the result of entering the commands shown in the Figure below?



S1(config)#spanning-tree mode pvst
S1(config)#spanning-tree vlan 10 root primary
S1(config)#spanning-tree vlan 20 root secondary
S1(config)#spanning-tree vlan 30 priority 12288

S2(config)#spanning-tree mode pvst
S2(config)#spanning-tree vlan 20 root primary
S2(config)#spanning-tree vlan 10 root secondary

S3(config)#spanning-tree mode pvst
S3(config)#spanning-tree vlan 30 root primary

A. S1 will set the priority value for VLAN 10 to 0

B. S2 will set the priority value for VLAN 10 to 24576

C. S3 will set the priority value for VLAN 30 to 8192

D. S1 will set the priority value for VLAN 20 to 24576

10. A network administrator enters the spanning-tree portfast bpduguard default command. What is the result of this command being issued on a Cisco switch?

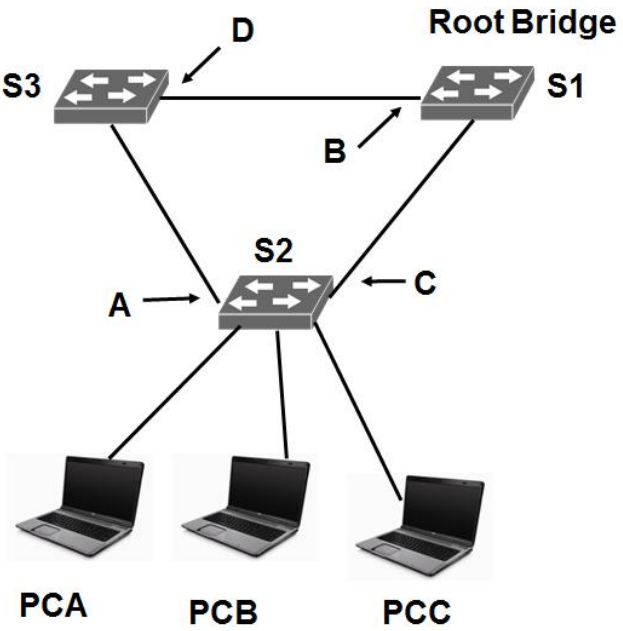
    A. Any switch port will be error-disabled if it receives a BPDU.

    B. Any trunk ports will be allowed to connect to the network immediately, rather than waiting to converge.

    C. Any switch port that has been configured with PortFast will be error-disabled if it receives a BPDU.

    D. Any switch port that receives a BPDU will ignore the BPDU message.

11. What are the possible port roles for ports A, B, C and D in the RSTP-enabled network shown below?



    A. alternate, root, designated, root

    B. designated, root, alternate, root

    C. alternate, designated, root, root

    D. designated, alternate, root, root

12. Which function is provided by EtherChannel?

    A. Spreading traffic across multiple physical WAN links

    B. Dividing the bandwidth of a single link into several time slots

    C. Enabling traffic from multiple VLANs to travel over a single Layer 2 link

    D. Creating one logical link by using multiple physical links between the two LAN switches

13. Which one of the following mode combinations enables PAgP establishment on a link between two switches S1 and S2?

    A. S1: On S2: Desirable

    B. S1: Auto S2: On

    C. S1: Desirable S2: Auto

    D. S1: Auto S2: Not configured

14. Which one of the following statements is **not** correct?

    A. In First Hop Redundancy, the IP address of the virtual router is configured as the default gateway for workstations on a specific IP segment.

    B. A protocol is used to identify two or more routers as the devices that are responsible for processing frames that are sent to the MAC or IP address of a single virtual router.

    C. When frames are sent from host devices to the default gateway, they use ARP to resolve the MAC address associated with IP address of the default gateway.

    D. The Hot Standby Router Protocol (HSRP) provides first hop routing redundancy and allows load balancing between a group of redundant routers.

15. Which routing protocol has the following properties? Fast convergence; scalable to large networks; uses a link state protocol; high resource usage.

    A. RIPv1

    B. RIPv2

    C. EIGRP

    D. OSPF

16. Which one of the following statements is correct?

    A. Distance vector protocols flood routing database information to all other nodes in the network.

    B. Link state protocols require less memory to maintain their database.

    C. Distance vector protocols only send out routing information when there is a change in the network.

    D. Link state protocols send out a regular ‘hello’ messages to identify connected neighbours.

17. Which one of the following statements is **not** correct?

    A. OSPF elects a designated router (DR) to be the collection and distribution point for LSAs sent and received in a multi-access network.

    B. A backup designated router (BDR) is elected in case the designated router fails.

    C. Routers that are neither designated routers nor backup designated routers become a DROTHER.

    D. A backup designated router assumes the role of designated router if BDR does not receive Hello messages from the designated router.

    E. DROTHER routers send Link State Advertisements only to the designated router.

18. Which one of the following statements is true?

    A. MD5 authentication passwords need to be the same throughout an area.

    B. MD5 authentication passwords need to be the same between neighbours.

    C. MD5 authentication can be enabled globally for all interfaces or on a per-interface basis.

    D. Global and per-interface OSPF MD5 authentication can be used on the same router.

19. Which statement describes a multiarea OSPF network?

    A. It consists of multiple network areas that are daisy-chained together.

    B. It requires a three-layer hierarchical network design approach.

    C. It has a core backbone area with other areas connected to the backbone area.

    D. It has multiple routers that run multiple routing protocols simultaneously, and each protocol consists of an area.

20. An ABR in a multiarea OSPF network receives LSAs from its neighbour that identify the neighbour as an ASBR with learned external networks from the Internet. Which LSA type would the ABR send to other areas to identify the ASBR, so that internal traffic that is destined for the Internet will be sent through the ASBR?

    A. LSA type 1

    B. LSA type 2

    C. LSA type 3

    D. LSA type 4

    E. LSA type 5

21. The network administrator has been asked to summarize the routes for a new OSPF area. The networks to be summarized are 172.16.8.0, 172.16.10.0, and 172.16.12.0 with subnet masks of 255.255.255.0 for each network. Which command should the administrator use to forward the summary route for area 15 into area 0?

    A. area 0 range 172.16.8.0 255.255.255.248

    B. area 0 range 172.16.8.0 255.255.248.0

    C. area 15 range 172.16.8.0 255.255.248.0

    D. area 15 range 172.16.8.0 255.255.255.248

22. A network administrator is implementing OSPF in a portion of the network and must ensure that only specific routes are advertised via OSPF. Which network statement would configure the OSPF process for networks 192.168.4.0, 192.168.5.0, 192.168.6.0, and 192.168.7.0, now located in the backbone area, and inject them into the OSPF domain?

    A. r1(config-router)# network 192.168.0.0 0.0.0.255 area 1

    B. r1(config-router)# network 192.168.4.0 0.0.3.255 area 1

    C. r1(config-router)# network 192.168.4.0 0.0.15.255 area 1

    D. r1(config-router)# network 192.168.0.0 0.0.3.255 area 0

    E. r1(config-router)# network 192.168.4.0 0.0.3.255 area 0

23. Which protocol is used by EIGRP to send hello packets?

    A. TCP

    B. UDP

    C. IP

    D. RTP

24. What is indicated when an EIGRP route is in the passive state?

    A. The route has the highest path cost of all routes to that destination network.

    B. The route must be confirmed by neighbouring routers before it is put in the active state.

    C. The route is a feasible successor and will be used if the active route fails.

    D. There is no activity on the route to that network.

    E. The route is viable and can be used to forward traffic.

25. Which address best summarizes the IPv6 addresses 2001:DB8:ACAD::/48, 2001:DB8:9001::/48, and 2001:DB8:8752::/49?

    A. 2001:DB8:8000::/34

    B. 2001:DB8:8000::/36

    C. 2001:DB8:8000::/47

    D. 2001:DB8:8000::/48

26. Two routers, R1 and R2, have established an EIGRP neighbour relationship, but there is still a connectivity problem. Which issue could be causing this problem?

    A. An authentication mismatch

    B. An access list that is blocking advertisements from other networks

    C. Automatic summarization that is disabled on both routers

    D. A process ID mismatch

27. What is a characteristic of manual route summarization?

    A. It requires high bandwidth utilization for the routing updates.

    B. It reduces total number of routes in routing tables.

    C. It cannot include supernet routes.

    D. It has to be configured globally on the router.

28. Two routers, R1 and R2, share a 64 kb/s link. An administrator wants to limit the bandwidth used by EIGRP between these two routers to 48 kb/s. Which command is used on both routers to configure the new bandwidth setting?

    A. ip bandwidth-percent eigrp 100 48

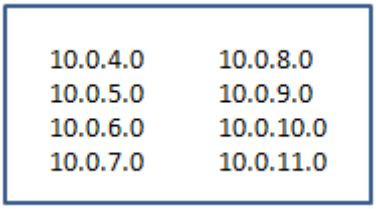
    B. ip bandwidth-percent eigrp 64 48

    C. ip bandwidth-percent eigrp 100 64

    D. ip bandwidth-percent eigrp 100 75

    E. ip bandwidth-percent eigrp 75 100

29. A network administrator has been asked to summarize the networks shown in the exhibit as part of a multiarea OSPF implementation. All addresses are using a subnet mask of 255.255.255.0. What is the correct summarization for these eight networks?



    A. 10.0.4.0 255.255.0.0

    B. 10.0.0.0 255.255.240.0

    C. 10.0.4.0 255.255.248.0

    D. 10.0.8.0 255.255.248.0

30. Which characteristic describes both ABRs and ASBRs that are implemented in a multiarea OSPF network?

    A. They usually have many local networks attached.

    B. They both run multiple routing protocols simultaneously.

    C. They are required to perform any summarization or redistribution tasks.

    D. They are required to reload frequently and quickly in order to update the LSDB.

31. An administrator is troubleshooting OSPFv3 adjacency issues. Which command would the administrator use to confirm that OSPFv3 hello and dead intervals are matching between routers?

    A. show ipv6 ospf interface

    B. show ipv6 ospf

    C. show ipv6 protocols

    D. show ipv6 ospf neighbor

32. Consider the router show command display shown below. R1 and R2 are connected to the same LAN segment and are configured to run OSPFv3. They are not forming a neighbour adjacency. What is the cause of the problem?

```
R1# show ipv6 ospf interface fa0/0
FastEthernet0/0 is up, line protocol is up
  Link Local Address FE80::21E:BEFF:FEF4:55C8, Interface ID 4
  Area 0, Process ID 10, Instance ID 0, Router ID 1.1.1.1
  Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 1.1.1.1, local address FE80::21E:BEFF:FEF4:55C8
  No backup designated router on this network
  Timer intervals configured, Hello 1, Dead 4, Wait 4, Retransmit 5
  <output omitted>
```

```
R2# show ipv6 ospf interface fa0/0
FastEthernet0/0 is up, line protocol is up
  Link Local Address FE80::21E:7AFF:FE5F:6650, Interface ID 4
  Area 0, Process ID 1, Instance ID 0, Router ID 2.2.2.2
  Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 2.2.2.2, local address FE80::21E:7AFF:FE5F:6650
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  <output omitted>
```

A. The IPv6 addresses of R1 and R2 are not in the same subnet.

B. The OSPFv3 process IDs of R1 and R2 are different.

C. The timer intervals of R1 and R2 do not match.

D. The priority value of both R1 and R2 is 1.

Part B – Written questions

Answer any three questions

B1. a) i) You have been asked to design a network for a company. The company is currently quite small but expects to grow over the next few years. Both scalability and availability are important considerations. Discuss the features that should be recommended in the proposed network design to address these considerations and explain the reason for including them.

7 marks

ii) Highlight any drawbacks of the proposed solutions.

2 marks

b) Discuss the advantages and disadvantages of layer 3 switches and routers.

3 marks

B2. Explain how load balancing can be implemented using:

a) Spanning Tree Protocol

4 marks

b) EtherChannel

4 marks

c) EIGRP routing protocol

4 marks

B3. a) In the network shown in Figure B3a, the routers are configured with the EIGRP routing protocol. Figure B3b shows one of the routes generated by the **show ip route** command on Router R2.

i) The value 3012096 shown in Figure B3b is the path metric. Using the information below, show how this is calculated (show your working).

2 marks

ii) Explain the meaning of each of the other parameters in Figure B3b.

5 marks

Note: The cost metric for the path is given by:
((10,000,000/bandwidth in kbps of slowest link)
+ (sum of delays in µs/10)) x 256
Default delay value for serial interfaces = 20,000 µs
Default delay value for GigabitEthernet interfaces = 10 µs

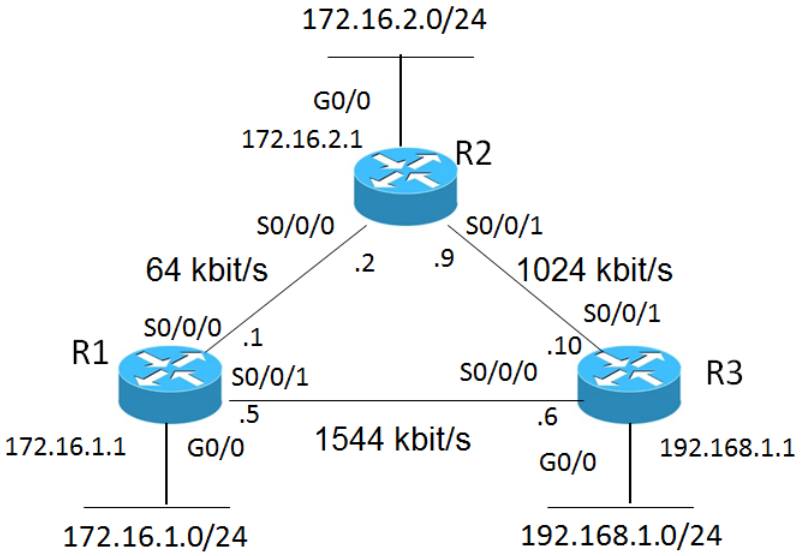


Figure B3a

```
R2#show ip route
D  192.168.1.0/24 [90/3012096] via 192.168.10.10,
00:12:32, Serial0/0/1
```

Figure B3b

b) A network engineer is testing connectivity between two routers using the EIGRP routing protocol. They have tried a ping test which was unsuccessful. Discuss the tests that they could carry out to determine the cause of the problem.

5 marks

B4. a) Discuss the reasons for using multi-area OSPF.

5 marks

b) Using the configuration information for routers R1, R2 and R3 shown in Figure B4, draw a diagram of the multi-area OSPF network formed by these routers and clearly label each router, network and area.

7 marks

```
R1(config)#router ospf 10
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.1.1.0 0.0.0.0 area 1
R1(config-router)#network 10.1.2.0 0.0.0.0 area 1
R1(config-router)#192.168.10.0 0.0.0.0 area 0

R2(config)#router ospf 10
R2(config-router)#router-id 2.2.2.2
R2(config-router)#192.168.10.0 0.0.0.3 area 0
R2(config-router)#192.168.10.4 0.0.0.3 area 0
R2(config-router)#network 10.2.1.0 0.0.0.255 area 0

R3(config)#router ospf 10
R3(config-router)#router-id 3.3.3.3
R3(config-router)#192.168.10.6 0.0.0.0 area 0
R3(config-router)#192.168.1.1 0.0.0.0 area 2
R3(config-router)#192.168.2.1 0.0.0.0 area 2
```

Figure B4

End of Examination Paper