



**FACULTY OF BUSINESS
AND INFORMATION TECHNOLOGY
PORIRUA CAMPUS**

**Bachelor of Information Technology
Graduate Diploma in Information
Technology**

**Networking Technologies (IT6217)
Semester 1 – 2013**

**Final Exam
Course Weighting 35%**

**Time Allowed: 180 minutes (3 Hours)
+ 10 minutes reading time**

Section	Description	Questions	Section Marks
A	Short Answers	1 – 6	30
B	Scenario Questions	7 - 13	35
C	Dynamic Routing	14 - 22	35
Total marks			100

Examination Notes

- ★ The time allowed for this examination is **3 hours** (180 minutes) + 10 minutes reading time.
- ★ You may not begin to write until you are notified that the **10 minute reading time** is over.
- ★ Answers to exam questions are to be written in the **exam answer book**.
- ★ This is a **CLOSED BOOK** examination. All closed book exam rules apply.
- ★ This exam is worth 40% of the total course weighting.
- ★ To pass the IT318 course, the requirements are:
 - A minimum percentage grade of 40% in this examination**AND**
 - A minimum overall course percentage grade of 50%.

Section A: Short Answers

(30 marks)

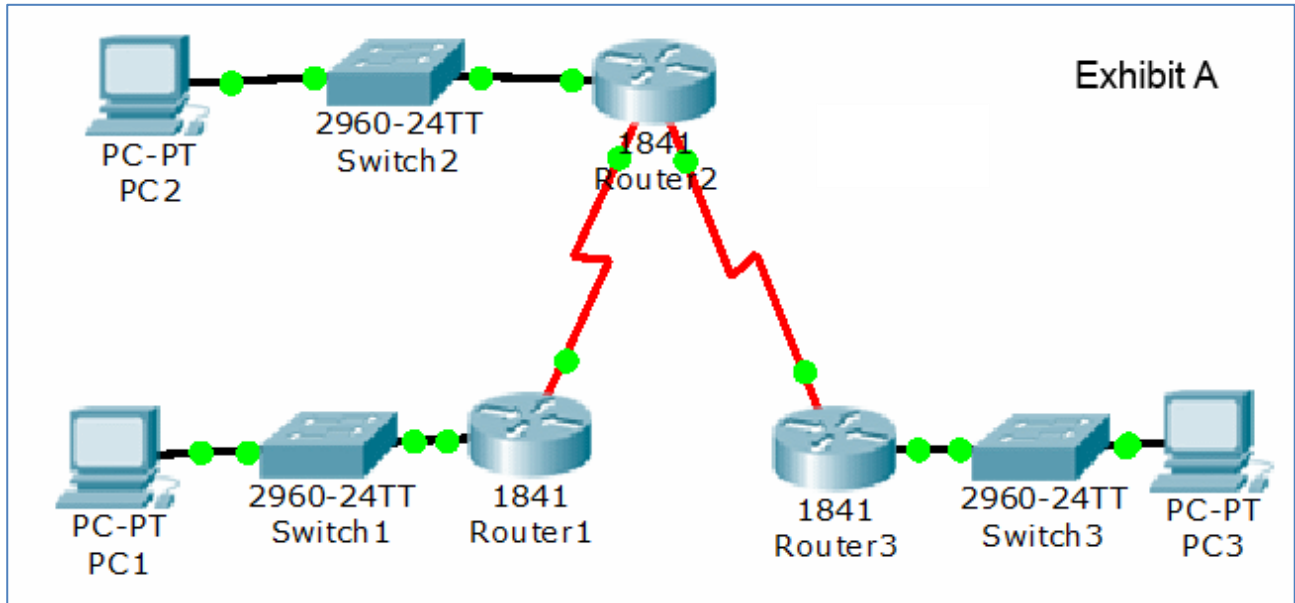
Answer all questions from this section. **Each question in this section is worth 5 marks.**

1. During your course, a hierarchical network switching model was recommended. Name and describe (using a diagram if you wish) the three layers in the recommended model.
2. Describe the purpose of a router and a switch, with reference to two layers of the the ISO network model. Ensure your description makes the relationship between the router and switch clear.
3. Switches can be configured to use store-and-forward switching or cut-through switching. Describe each method, and list one advantage of each.
4. Consider Distance Vector Routing. What do the terms Distance and Vector refer to? List three characteristics of distance vector routing that are not found in Link-State routing.
5. The process of Wireless Client and Access Point Association includes four types of frames:
 - Beacons
 - Probes
 - Authentication
 - AssociationDescribe **three (3)** of these types of frames.
6. Name two common sources of interference in a wireless network configured with no overlapping channels. Very briefly describe why these sources cause interference, and two ways the interference problem can be fixed.

Section B: Scenario Questions

(35 marks)

Consider Exhibit A. Note that all interfaces are operating normally.



Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	172.16.3.1	255.255.255.0	N/A
	S0/0/0	172.16.2.1	255.255.255.0	N/A
R2	Fa0/0	172.16.1.1	255.255.255.0	N/A
	S0/0/0	172.16.2.2	255.255.255.0	N/A
	S0/0/1	192.168.1.2	255.255.255.0	N/A
R3	Fa0/0	192.168.2.1	255.255.255.0	N/A
	S0/0/1	192.168.1.1	255.255.255.0	N/A
PC1	NIC	172.16.3.10	255.255.255.0	172.16.3.1
PC2	NIC	172.16.1.10	255.255.255.0	172.16.1.1
PC3	NIC	192.168.2.10	255.255.255.0	192.168.2.1

The following is a summary of output from the PC1 command prompt:

```

PC>ping 172.16.3.1
Pinging 172.16.3.1 with 32 bytes of data:
Reply from 172.16.3.1: bytes=32 time=29ms TTL=255
Ping statistics for 172.16.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 29ms, Average = 7ms

PC>ping 172.16.2.1
Pinging 172.16.2.1 with 32 bytes of data:
Reply from 172.16.2.1: bytes=32 time=1ms TTL=255
Ping statistics for 172.16.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 172.16.2.2
Pinging 172.16.2.2 with 32 bytes of data:
Request timed out.
Ping statistics for 172.16.2.2:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),

PC>
  
```

This output was from Router 1

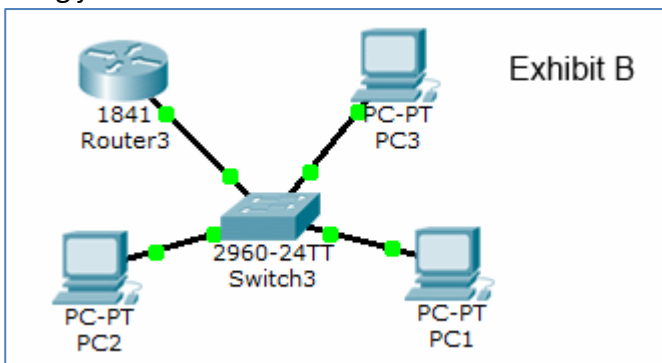
```
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

    172.16.0.0/24 is subnetted, 2 subnets
C       172.16.2.0 is directly connected, Serial0/0/0
C       172.16.3.0 is directly connected, FastEthernet0/0
R1#
```

7. Briefly describe a possible reason for the failure of pings from PC1 to 172.16.2.2. Your answer should name a possible reason, and describe why that could cause the observed behaviour. (5 marks)
8. Describe two approaches that could fix this problem. You are free to list actual commands, however marks will be allocated for your description of each approach. (5 marks)
9. Choose one of the approaches you suggested in question 8, and describe the difference you would expect to see in the `show ip route` command on Router 1 after implementing the change. Your answer should describe two more lines that will be in the output. A description, including IP addresses, is required – you do not have to be exact. (5 marks)

Consider Exhibit B. VLANs have been used to support the same PCs on a similar logical network, using just one router and switch.



Device	Interface	Switch Port	VLAN ID	IP Address	Subnet Mask	Default Gateway
R3	Value Needed!	Fa 0/1				
	Value Needed!		10	192.168.2.1	255.255.255.0	N/A
	Value Needed!		20	172.16.1.1	255.255.255.0	N/A
	Value Needed!		30	172.16.3.1	255.255.255.0	N/A
PC1	NIC	Fa 0/5	30	172.16.3.10	255.255.255.0	172.16.3.1
PC2	NIC	Fa 0/8	20	172.16.1.10	255.255.255.0	172.16.1.1
PC3	NIC	Fa 0/10	10	192.168.2.10	255.255.255.0	192.168.2.1

10. You have been given three VLAN IDs to use. What sort of configuration does switch port Fa 0/1 need? List the four missing Interface names for R3. (5 marks)
11. Explain, with a diagram if you wish, how VLANs will enable this network to work in a similar way to Exhibit A, with only one router. (5 marks)
12. Name the protocol that is used to enable several VLANs to share the link between Router 2 and Switch 3. List and describe two functions or features of this protocol. (5 marks)
13. Name the protocol that is used to manage links between multiple Switches when they are used as part of a large LAN with multiple redundant links between switches. List and describe two functions or features of this protocol. (5 marks)

Section C: Dynamic Routing

(35 marks)

Consider Exhibit C. (There is a larger copy of Exhibit C at the end of this paper.)

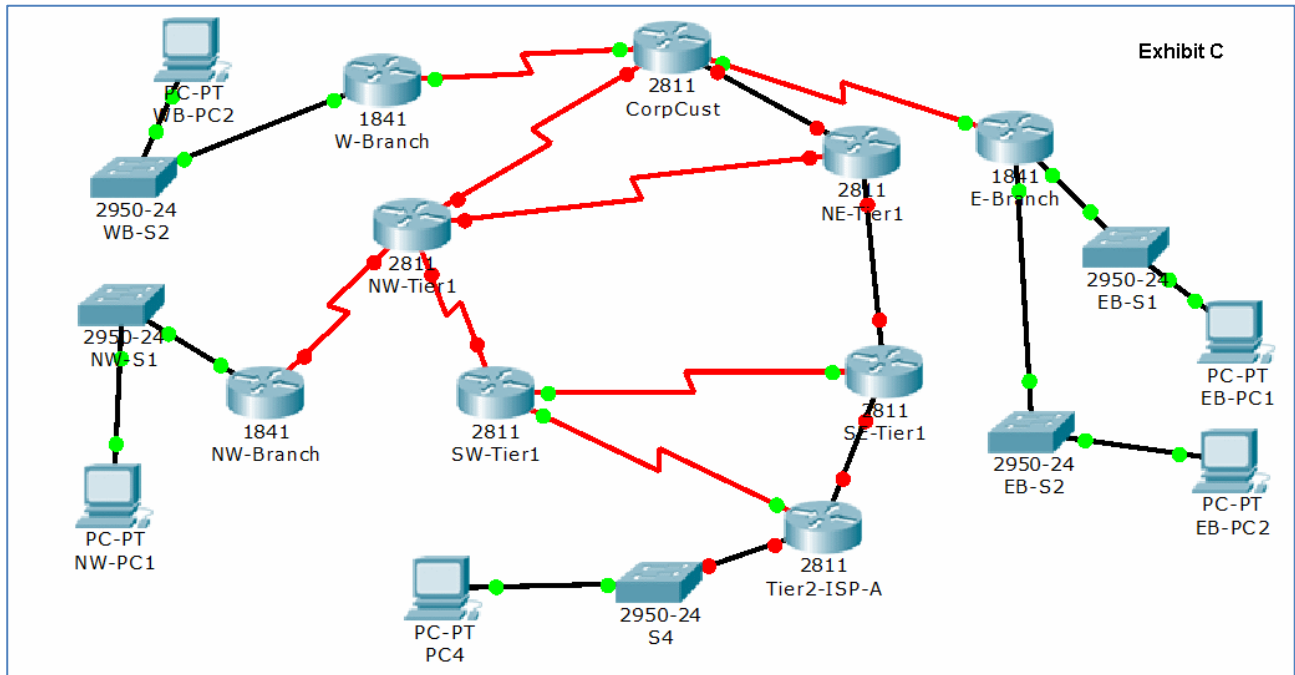


Exhibit C shows a hierarchical corporate network. Tier1 is a backbone network across several cities. Some of these links use high-speed fibre links, the others use slower serial links.

Each straight black link has an OSPF cost of 10

Each red link has an OSPF cost of 48

14. There are five steps in the Link-State routing process. Name each step, and briefly describe the function of each step. (10 Marks)

15. In your answer book, copy and complete the following table: (5 Marks)

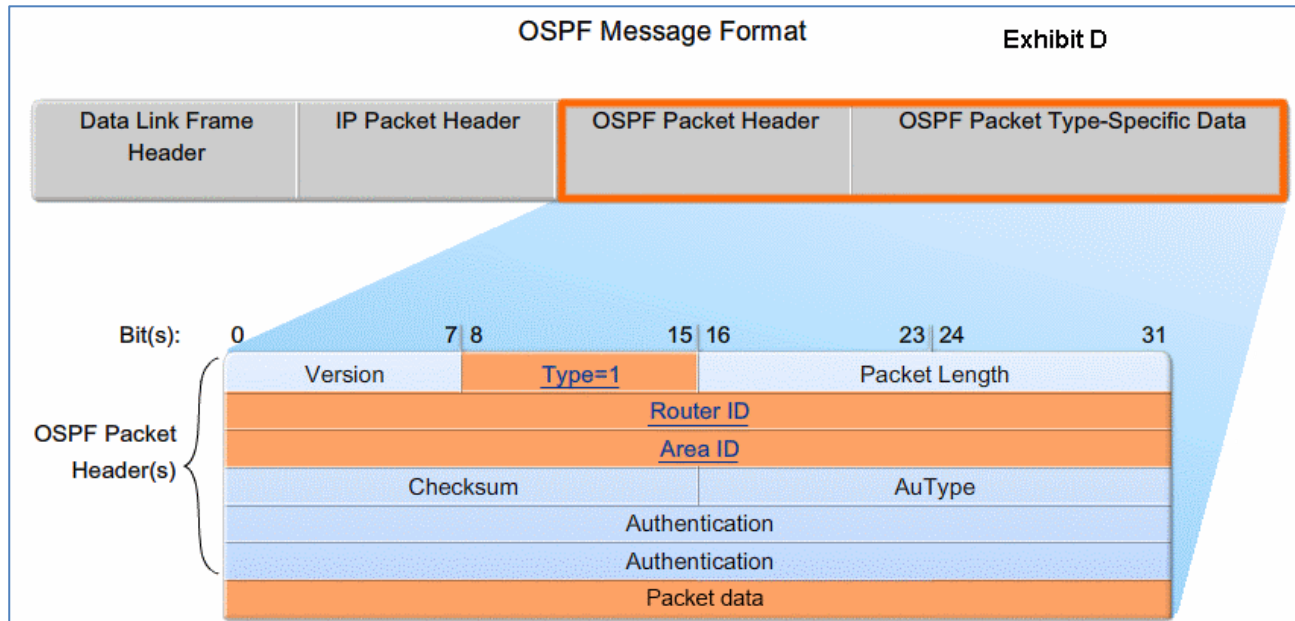
CorpCust Link-State Database	
Destination Router	Lowest Cost
Tier2-ISP-A	
SW-Tier1	
SE-Tier1	
NW-Tier1	
NE-Tier1	
NW-Branch	
W-Branch	
E-Branch	

16. OSPF uses an election process. Name and describe two router designations that result from the election. Name one way to change the election result. (5 Marks)

17. In your answer book, complete the following table by clearly indicating the five missing values: (5 Marks)

Classification of Routing Protocols				
Interior Gateway Protocols			Exterior Gateway Protocols	
Distance Vector Routing Protocols		Link State Routing Protocols		
Classful		(not in IT6217)	(none)	(none)
Classless				

Consider Exhibit D



Answer the following questions in your answer book.

18. How big is the Packet Length field? (1 mark)
19. There are five packet types. List three of them. (3 marks)
20. Why might packets have a different Packet Length? Which field shown in Exhibit D can vary in length? (2 marks)
21. List the three criteria that, together, determine the Router ID (3 marks)
22. Describe one reason why authentication of OSPF packets is important for a business network. (1 mark)

*** END OF EXAM ***

