FACULTY OF BUSINESS
AND INFORMATION TECHNOLOGY
PORIRUA CAMPUS

Bachelor of Information Technology
Diploma in Information Technology
Level 6
Graduate Diploma in Information Technology

Networking Technologies (IT6x87)
Semester 1 – 2016

Final Exam
Course Weighting 40%

Time Allowed: 120 minutes (2 Hours)
+ 10 minutes reading time

Section	Description	Questions	Section Marks
A	Short Answers	1 to 7	42
B	Scenario-based	8 to 15	38
C	SDN Questions	16 to 19	20
		Total marks	**100**

Examination Notes

- The time allowed for this examination is **2 hours** (120 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 IT6x87 course, the requirements are:
  - A minimum percentage grade of 40% in this examination

  AND
  - A minimum overall weighted course percentage grade of 50%.

Section A: Short Answers (42 marks)

Answer all questions from this section. **Each question in this section is worth 6 marks.**

1. There are many types of VLANs. Explain briefly the following types of VLANs:
   - Data VLAN
   - Native VLAN
   - Management VLAN
   - Voice VLAN

2. This course suggests switch design using a three tier Hierarchy. List the names used to describe the tiers, and describe how this hierarchy helps archive a "Borderless Switched Network".

3. 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.

4. 

The exhibit above shows a routing table entry, and identifies seven identifiers of the entry. List the names of six of the identifiers.

5. Dynamic routing can be used in a network. Describe two advantages and two disadvantages of dynamic routing.

6. This course described two types of VPN. Name each type, and list two advantages of each.

7. Describe three parts of an SDN network that are not found in a conventional network.

Section B: Scenario-based (38 marks)

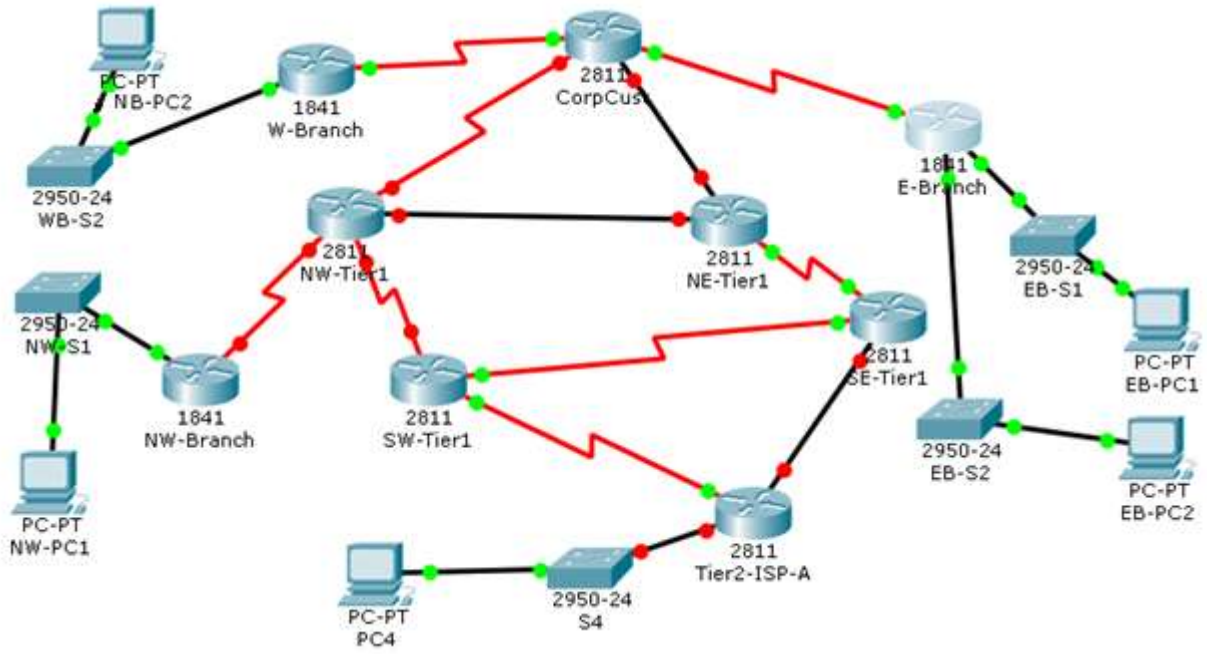


Exhibit A. shows a hierarchical corporate network. Tier1 is a backbone network across several cities. Some of these links use high-speed fibre, the others use slower serial links.

8. The network currently uses RIP. List the path from NW-PC1 to NB-PC2 and explain why that path will be chosen. (5 marks)

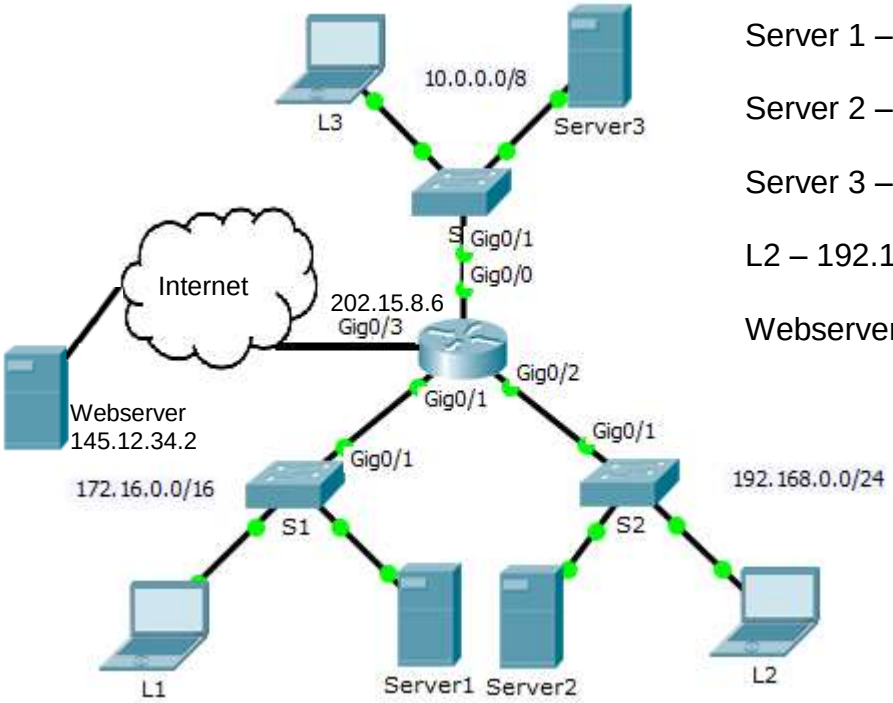
9. Describe three advantages of changing from RIP to OSPF. (6 marks)

The network has been changed to using the OSPF protocol.
Each straight black link has an OSPF cost of 10
Each red link has an OSPF cost of 48

10. List the path from NW-PC1 to NB-PC2 using OSPF. Why has it changed? (5 marks)

11. There are five stub networks in this diagram. These can be supported using static routes instead of OSPF. Identify the stub networks. List three advantages of static routes. (5 marks)

12. The link between CorpCus and E-Branch currently uses a very expensive private leased line. The company wishes to replace this using Internet links, but are unsure about what is involved.
    * Very briefly describe a technology for making this link over the Internet.
    * Describe three advantages of this technology compared to private links. (5 marks)



Server 1 – 172.16.255.254/16

Server 2 – 192.168.0.254/24

Server 3 – 10.255.255.254/8

L2 – 192.168.0.3/24

Webserver – 145.12.34.2

Exhibit B. shows an office network.
This network must implement the following three policies:

- Hosts from the 192.168.0.0/24 network are unable to access any TCP service of Server3.
- Hosts from the 10.0.0.0/8 network are unable to access the HTTP service of Server1.
- Hosts from the 172.16.0.0/16 network are unable to access the FTP service of Server2.

The following ACLs have been defined:

ACL 1
```
ip access-list extended 192_to_10
 deny tcp 192.168.0.0 0.0.0.255 host 10.255.255.254
!
```

ACL 2
```
ip access-list extended 10_to_172
 deny tcp 10.0.0.0 0.255.255.255 host 172.16.255.254 eq www
 permit ip any any
!
```

ACL 3
```
ip access-list extended 172_to_192
 deny tcp 172.16.0.0 0.0.255.255 host 192.168.0.254 eq ftp
 permit ip any any
```

13. This course includes best practise for placing ACLs. What is the rule you will use to place the ACLs in this scenario? List the interface and direction where each of these ACLs should be placed. You do not have to use correct IOS syntax (4 marks)

14. L2 was able to access both ftp and http on Server2, but was able to access neither ftp nor http on Server1. This is not in the organization's policy. What causes this problem, and how could this be fixed? (3 marks)

15. The organisation has one public IP address (202.15.8.6). L2 (192.168.0.3) needs to access Webserver 145.12.34.2. L2 uses port number 2468 for this request. List the correct IP address and port number of each of the following fields:: (5 marks)
Inside Global IP Address; Inside Local IP Address;
Outside Local IP Address; Outside Global IP Address

Section C: Software Defined Networking (SDN) questions (20 marks)

Openflow is a protocol that relies on transferring messages between a controller and switch. This course includes some analysis of these messages. Exhibit C shows the names and direction of packets exchanged between controller and switch..
Note there are six separate message types shown here:

- Hello in two directions
- Feature Request and reply
- Multipart Request and reply
- Set Config
- Packet In
- Flow Modification

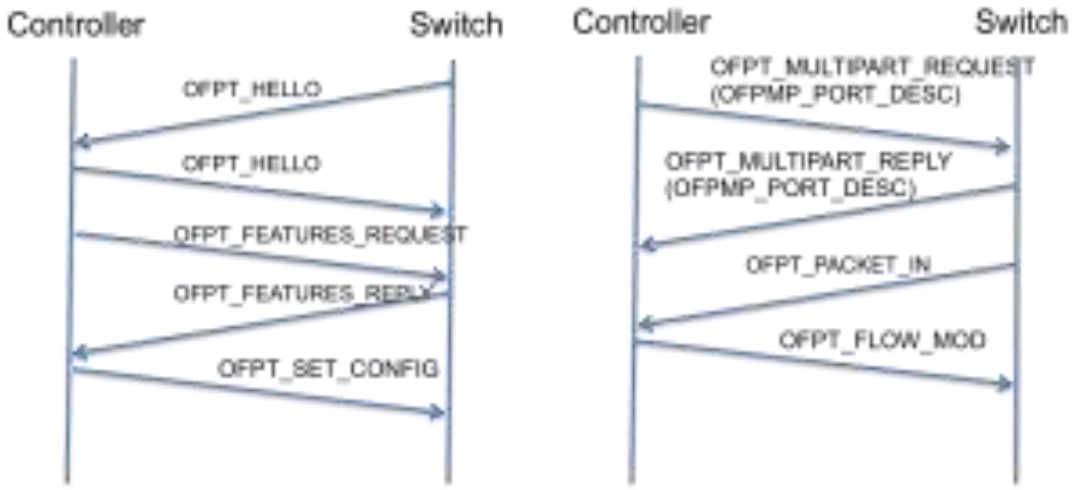


Exhibit C. Packets exchanged between controller and switch from SDNhub OpenFlow tutorial.

16. Choose five of the message types listed. Describe the purpose of each message type. (10 marks)

17. An SDN flow consists of a Rule, Action, and Stats
List three parameters that can be included in the rule (3 marks)

```
mininet> dpctl dump-flows -O OpenFlow13
*** s1 ------------------------------------------------------------
OFPST_FLOW reply (OF1.3) (xid=0x2):
cookie=0x0, duration=106.605s, table=0, n_packets=6, n_bytes=420, priority=0
                                                    actions=CONTROLLER:65509
mininet>
```

Exhibit D. Installed flows example from Required SDN Lab.

18. Exhibit D shows the flow in an SDN switch (s1) after initially starting the controller and switch. Describe the purpose of this flow (3 marks)

19. During this course, it was suggested that the IT environment has become more 'open' over the past twenty years. Describe two advantages of this open approach to developing the environment. (4 marks)

***** END OF EXAM *****