Whitireia NEW ZEALAND

FACULTY OF BUSINESS AND INFORMATION TECHNOLOGY PORIRUA CAMPUS

Bachelor of Information Technology
Graduate Diploma in Information Technology

Networking Technologies (IT6217)
Semester 1 – 2014

Final Exam

Course Weighting 30%

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

Section	Description	Questions	Section Marks
A	Short Answers	1 – 6	30
B	Long Answers	7 - 13	35
C	Scenario – VPN Technology	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 30% 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 weighted 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. Describe the distribution layer in a three-layer network design. Your answer should include the purpose of the devices at this layer, and examples of connections to other devices.

2. It is useful to be able to access network equipment remotely. Name two remote access protocols you have studied, and clearly describe two advantages of each.

3. There are two primary switch forwarding methods. Name and describe them.

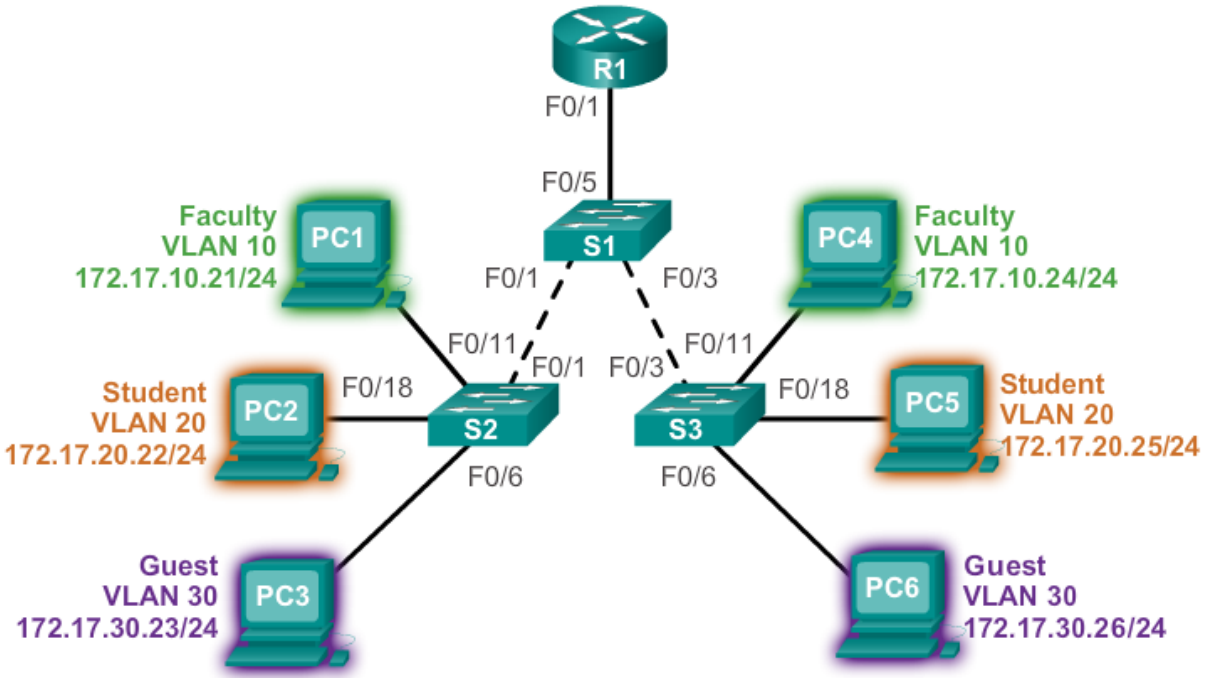
4. Name and describe two reasons for using VLANs.

5. You have studied link-state routing and distance-vector routing. Name a general term to describe these types of routing protocol and list two characteristics of each.

6. Describe how a WAN fits in the OSI model.

Section B: Long Answers (35 marks)

Consider Exhibit A. – Example of small network using VLANs
The network has been tested, and each machine can communicate with the other machine on the same VLAN.



7. List the ports at each end of each trunk line in the diagram. (3 marks)

8. How many broadcast domains are there in this network? Write one or two lines to justify your answer. (2 marks)

9. Describe what is necessary to enable traffic to move between VLANS. (3 marks)

10. This is currently a 'flat' network, with all devices, and the router, connected to the same physical switches. How could this network be changed to a 'Two-Tier Collapsed Core Design"?. (4 marks)

11. List three functions you would expect to see implemented at the distribution layer Hierarchical Network Design? (3 marks)

Consider Exhibit B. – Example of output from a Show IP Route command on R1 router

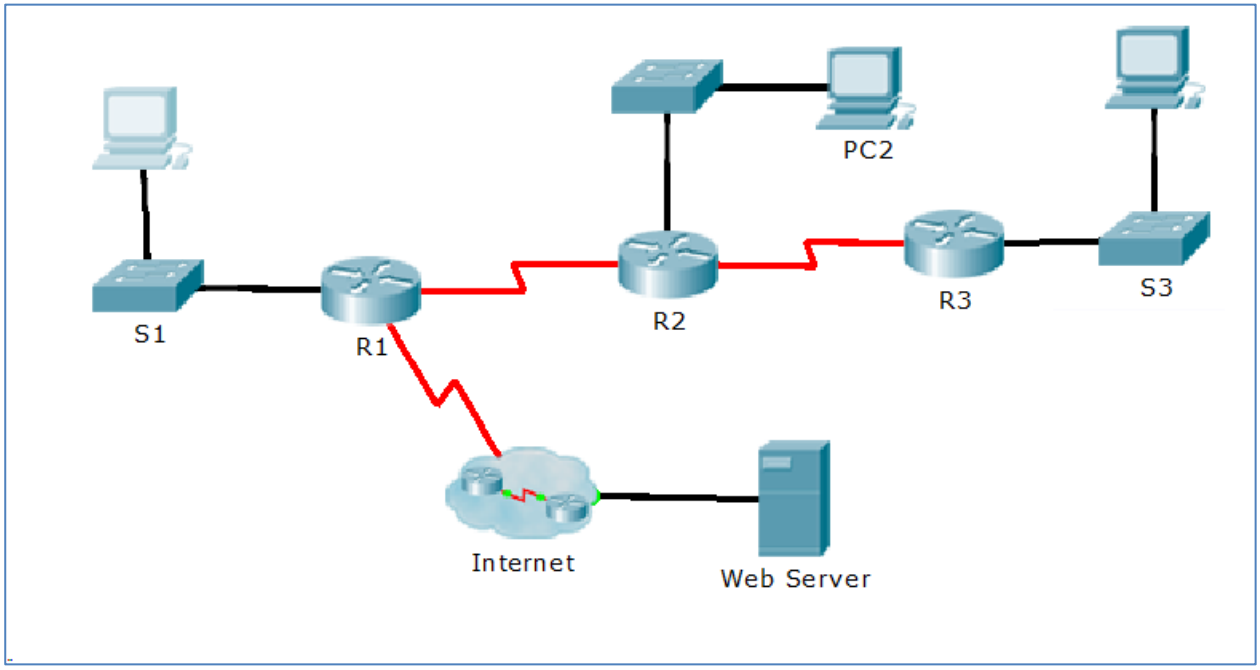
```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP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

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, Serial0/0/0
L       192.168.2.1/32 is directly connected, Serial0/0/0
R    192.168.3.0/24 [120/1] via 192.168.2.2, 00:00:22, Serial0/0/0
R    192.168.4.0/24 [120/1] via 192.168.2.2, 00:00:22, Serial0/0/0
R    192.168.5.0/24 [120/2] via 192.168.2.2, 00:00:19, Serial0/0/0
     209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.224/30 is directly connected, Serial0/0/1
L       209.165.200.225/32 is directly connected, Serial0/0/1
S*   0.0.0.0/0 is directly connected, Serial0/0/1
R1#
```

and Exhibit C. – Example of output from a PC attached to R2 router in this network:

```
PC2> ping 64.100.0.10

Pinging 64.100.0.10 with 32 bytes of data:

Request timed out.
Reply from 64.100.0.10: bytes=32 time=11ms TTL=125
Reply from 64.100.0.10: bytes=32 time=11ms TTL=125
Reply from 64.100.0.10: bytes=32 time=2ms TTL=125

Ping statistics for 64.100.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 11ms, Average = 8ms

PC2> tracert 64.100.0.10

Tracing route to 64.100.0.10 over a maximum of 30 hops:

  1   18 ms     0 ms      1 ms      192.168.3.1
  2   0 ms      1 ms      0 ms      192.168.2.1
  3   0 ms      2 ms      0 ms      209.165.200.226
  4   2 ms      0 ms      1 ms      64.100.0.10

Trace complete.

PC2>
```

Questions are on the next page …

and Exhibit D. – Diagram of this network:



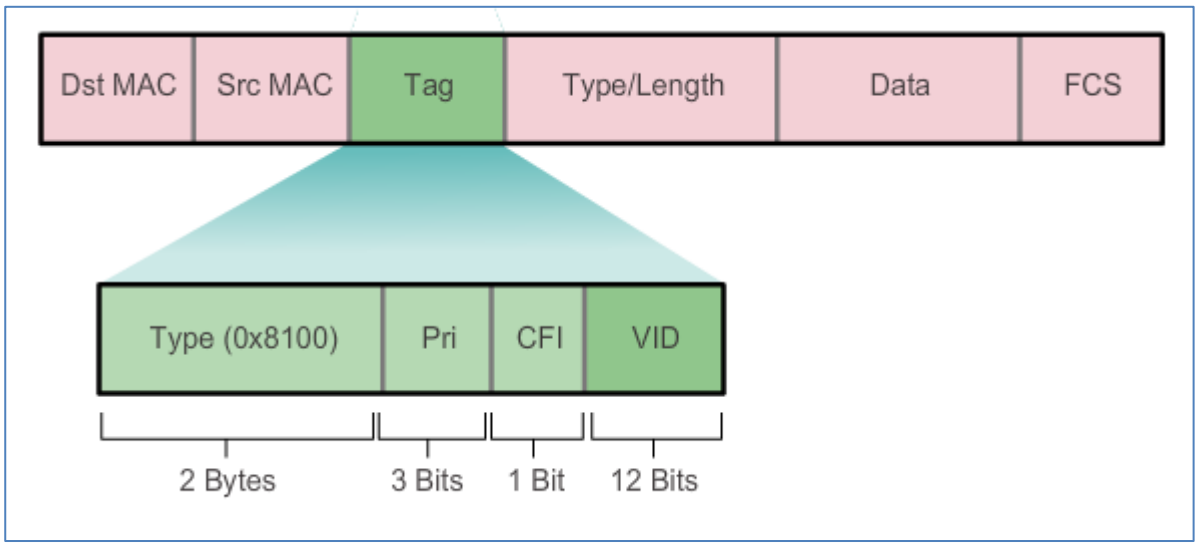
12. Which dynamic routing protocol is being used in this network? How can you tell? (2 marks)

13. In the ping command in exhibit C, why did the first request time out? (2 marks)

14. Copy the following table into your answer book.
Using the information from exhibits B and C, work out the following IP addresses for the devices shown in exhibit D (11 marks)

Device	IP address	Port (R1 only)
R1 (First port)		
R1 (Second port)		
R1 (Third port)		
R2		
R3 (First port)		
R3 (Second port)		
PC2		
Internet Gateway		
Web Server		

Consider Exhibit E. – Fields in an 802.1Q Ethernet frame



15. How big is the Tag field? (1 marks)

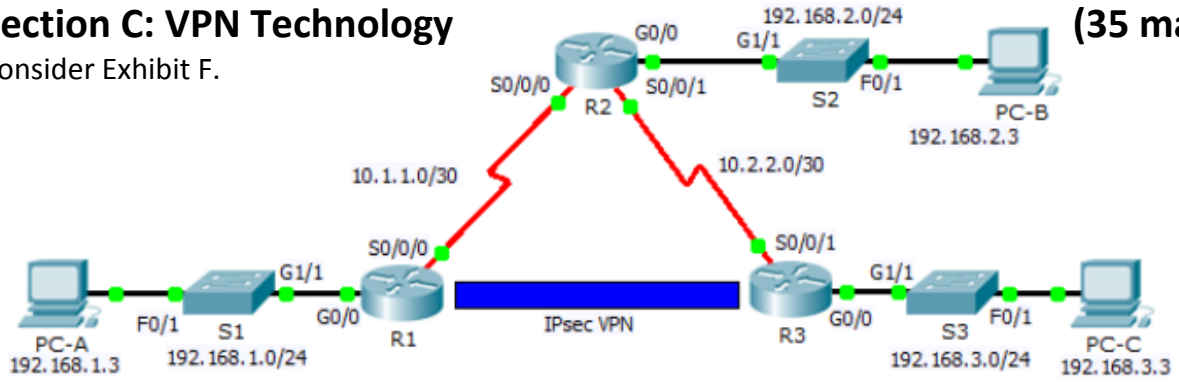
16. Why is the destination MAC address the first field in a frame ? (2 marks)

17. Name in full, and describe the function of, the FCS field?

(2 marks)

Section C: VPN Technology (35 marks)

Consider Exhibit F.



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.1.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
R2	G0/0	192.168.2.1	255.255.255.0	N/A
	S0/0/0	10.1.1.1	255.255.255.252	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
R3	G0/0	192.168.3.1	255.255.255.0	N/A
	S0/0/1	10.2.2.2	255.255.255.252	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-B	NIC	192.168.2.3	255.255.255.0	192.168.2.1
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1

18. State what VPN stands for, describe the general purpose of a VPN. (2 marks)

19. There are two broad types of VPN. What type of VPN is shown above? Describe (with a diagram if you wish) how the other type of VPN could be added to the network above. (6 marks)

20. This diagram shows an IPsec VPN. GRE is another protocol that can be used to build a VPN. List three characteristics of a GRE VPN. (6 marks)

21. A user traces the route from PC-A to PC-B. List the IP address of each layer three device encountered on this route. (6 marks)

22. A user traces the route from PC-A to PC-C. List the IP address of each layer three device encountered on this route. (6 marks)

23. There are seven policy Parameters that can be applied to an IPsec VPN. Name and describe three of them. Each description should include the unit or standard used by the parameter, and an example of a suitable value for that parameter. (9 marks)

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