

COMMONWEALTH OF AUSTRALIA

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Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2016

FINAL EXAMINATION	DURATION				
HIT174 – Network Engineering Concepts	<table border="1"> <tr> <td>Reading Time:</td> <td>10 minutes</td> </tr> <tr> <td>Writing Time:</td> <td>180 minutes</td> </tr> </table>	Reading Time:	10 minutes	Writing Time:	180 minutes
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INSTRUCTIONS TO CANDIDATES

The examination has **3** sections

Section A: Suggested Time:	Multiple Choice Questions: Answer ALL 20 questions 40 minutes (20 marks)
Section B: Suggested Time:	Short Answer Questions: Answer ALL 13 questions 95 minutes (50 marks)
Section C: Suggested Time:	Case Study: Answer ALL questions 45 minutes (30 marks)

Note that questions **ARE NOT** of equal value.

Read **ALL** questions carefully.

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

No calculators are permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 20 Page Book

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DOUBLE-SIDED.**

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Section A

Multiple Choice Questions

Total No of Marks for this section: 20

This section should be answered in the Answer Booklet provided.

Each question is worth 1 mark. Suggested Time allocation for Section A: 40 mins

Section B

Short Answer Questions

Total No of Marks for this section: 50

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated.

Suggested Time allocation for Section B: 95 mins

Question 1

Question 2

Convert the following: You are required to show all appropriate workings.

- (a) Decimal to binary notation: 213.158.101.34
- (b) Hexadecimal to Binary notation: C4:6A:59:F3:B0:E8

(4 marks)

Question 3

Use either the Binary AND or Binary OR method to answer the following questions. You are required to show all appropriate workings.

- (a) What is the network address of 192.168.50.135 with subnet mask of 255.255.255.192?
- (b) What is the broadcast address of 10.100.37.58 with a prefix of /15?

(4 marks)

Question 4

Fill in the table below:

Acronym	Full Name	OSI layer
UDP		
DNS		
ICMP		
OSPF		
IP		
SNMP		
TCP		

(14 marks)

Question 5

What are the strengths and weaknesses of the OSI and TCP/IP models?

(4 marks)

Question 6

What is the purpose of the twists in UTP cable?

(1 mark)

Question 7

In what network circumstances would it be more advantageous to use static routing instead of dynamic routing protocols?

(4 marks)

Question 8

Provide three reasons for having a server in a home network.

(3 marks)

Question 9

What are the advantages of using Network Address Translation (NAT)?

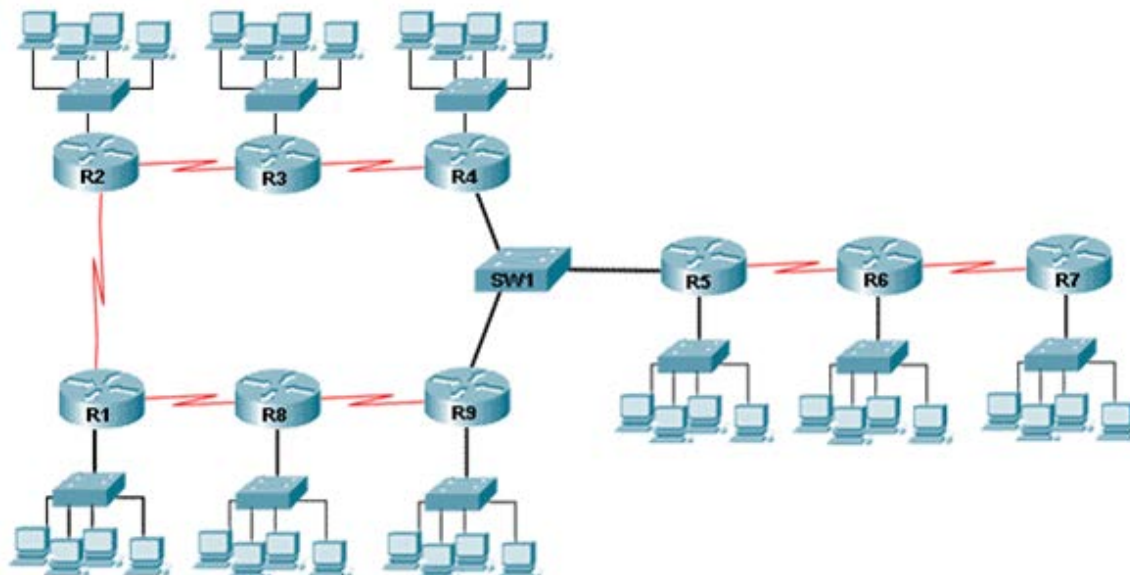
(3 marks)

Question 10

Write down the private IPv4 address range. What is the purpose of these private addresses?

(4 marks)

Question 11



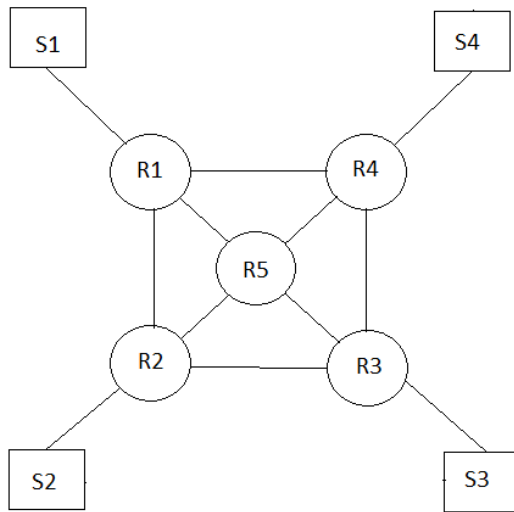
The IP address for the above network is 192.168.151.0/24.

- (a) What is the total number of networks in the diagram above?
- (b) Each individual internal network (the networks behind the routers) must support a maximum of 13 User PCs. Can this be done without using VLSM? Why?
- (c) Write briefly how VLSM can be used in this case to achieve the required conditions?
(You do not need to write out the IP addresses for the individual subnets)

(3 marks)

Question 12

XYZ is a large organisation that has employed you to setup the network for their company. XYZ has four main groups: administrative, research, management and technical. You are asked to create a LAN for each group and you came up with the topology below:



R1 to R5: Routers

S1: Switch 1 for the Administrative LAN

S2: Switch 2 for the Research LAN

S3: Switch 3 for the Management LAN

S4: Switch 4 for the Technical LAN

R5: connects to the Internet

- (a) There is a limited budget and your boss wants to spend the least amount of money to achieve the same goal. What will you do?
- (b) If redundancies are to be considered for the new topology that you came up in part a, what will you do?

(4 marks)

Section C

Case Study

Total Number of Marks for this section: 30

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated. Suggested Time allocation for Section C: 45 mins

ABC is the branch company of XYZ organisation. You are given the task of setting up the network for their company. They have the IP address of 158.150.100.0 / 23 and their staffs are divided into 5 groups as shown below.

- Administrative: 80 staff
- Marketing: 40 staff
- Research: 20 staff
- Technical: 10 staff
- Management: 3 staff

You are asked to create a LAN for each group and to set up the following:

- ABC has one server and is kept within the technical LAN. The server is allocated the last usable host address of that LAN
- There is a printer for each group and it is allocated the second usable host address of each LAN
- The gateway address is assigned the first usable IP address for each LAN
- Other devices connected to the network are allocated IP address via DHCP
- Each group should be in different subnets for security purposes.

1. Design the subnets and fill in the table below.

Group	Network address	Prefix	1 st usable host address	Last usable host address	Broadcast address
Administrative					
Marketing					
Research					
Technical					
Management					

(10 marks)

2. What is the IP address and subnet mask (in dotted decimal notation) of the server? (2 marks)
3. What is the IP address and subnet mask (in dotted decimal notation) of the printer for the marketing LAN? (2 marks)
4. What is the gateway IP address and subnet mask (in dotted decimal notation) for the management LAN? (2 marks)
5. Draw a topology for ABC Company. You have to fulfil the following requirements:
 - Show the routers (represented by a circle, a maximum of 3 ports for each router), switches (represented by a rectangle, a maximum of 64 ports for each switch) and the respective LANs.
 - State the type of connections you have used between the devices.
 - State the point of connection to the Internet
 (7 marks)

Based on your topology, answer the following questions:

6. What is the total number of networks in your topology? (Exclude the connection from the router to the Internet) (1 mark)
7. How many unallocated host IP address are you left with? (2 marks)
8. Which dynamic routing protocol would you configure? Why? (2 marks)
9. Would you consider static routing instead? Why? (2 marks)