COIT20261 Network Routing and Switching (Term 2, 2018)

Assignment item —Written Assessment-2

Due date:	11:45pm AEST, Friday, Week 10	**ASSESSMENT 2**
Weighting:	25%	

Objectives

This assessment task requires you to demonstrate your knowledge of routing concepts by completing a number of exercise questions.

The questions are designed to help you to achieve the unit learning outcomes as listed in the unit profile.

Instructions

You must do this assignment on your own – it is not a group assignment.

These questions will require more time and effort than the first assignment so plan ahead and start as early as possible. Question #3 may require additional research and analysis to complete.

Type all your answers in the '**Template for Your Answers**' Section of this document and upload only that template. You can do that by copying the Template section into a new Word document for uploading. Answers that are not typed into the "Template for Your Answers" section may not be marked, or may be returned to you for re-typing and re-submission – late penalties will apply.

Where instructed, you must show the steps you took to arrive at your answers. Write your answers **in your own words** to avoid potential plagiarism and copyright violations.

You must submit the Answer section as a **Word file (.doc or .docx)**. Do not submit PDF's or any other type of file without express permission from the Unit Coordinator.

Plagiarism Procedures can be found in the CQUniversity Policies section of the Unit Profile.

Assessment Requirements and Marking Criteria

There are 3 main questions each with sub-questions and the requirements are stated for each one. You must answer all questions and their sub-questions. Marks are indicated in the Answer Template.

The questions will be marked on correctness, logic and clarity, and addressing all parts of the question.

The Assignment Questions begin on the next page.

REMEMBER, USE THE ANSWER TEMPLATE FOR ALL YOUR ANSWERS

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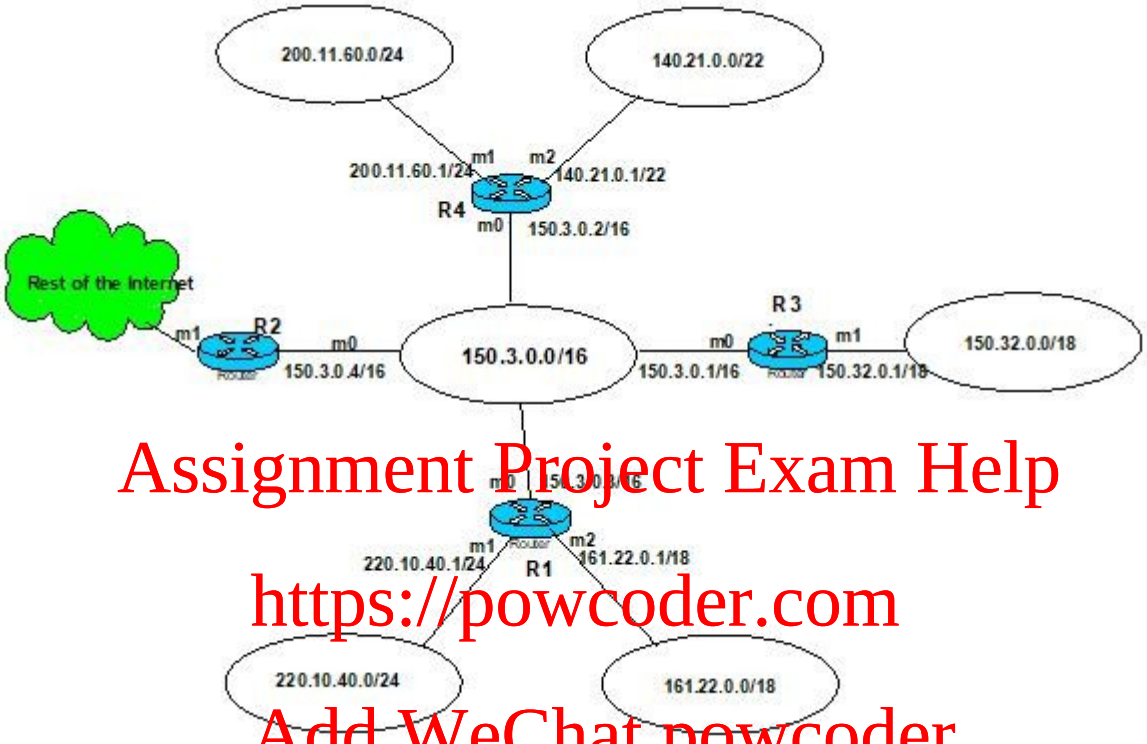
Question 1 – Routing **(10 marks)**

Given the following network diagram, assume that all the networks shown are aware of each other and have fully updated routing tables, and that router R2 has been configured as the Default router. Answer the questions that follow.



The questions (1 mark each except q.8):

1. From the point of view of router R1, what is the next-hop address for a packet addressed to host 161.22.0.15/18?
2. From the point of view of router R4, which of its interfaces would it choose for a packet being sent to network 161.22.0.0/18?
3. A host with an IP address of 200.11.60.36/24 has just sent a packet to a host with address 220.10.40.140/24. How many hops are required for this delivery?
4. A packet originating from network 140.21.0.0/22 arrives at router R4, however, R4 determines that the destination network is not in its routing table. What does R4 do with the packet?
5. A packet arrives at router R1 with a destination address of 161.22.0.126/18. Which interface port would R1 forward the packet out of?
6. A packet at router R3 has a destination address of 200.11.60.15/24. What next-hop address would R3 use for this packet?
7. A packet is waiting at router R3 for forwarding. If the next-hop was a "direct delivery", which of these three networks would be the destination network - 150.32.0.0/18, **or** 140.21.0.0/22, **or** 161.22.0.0/18?

8. Complete the information in the routing table for **router R3** for networks 150.3.0.0/16, 150.32.0.0/18, and the Default network. Show the masks in longest mask order using CIDR format (3 marks). Do not show the other networks.

Question 2 – Fragmentation in IPv4 **(5 marks)**

An IP datagram 4000 bytes long with no options arrives at a router, which determines that the next destination has an MTU of 1,500 bytes. Complete the following questions, showing your calculations and reasoning.

a) As the router decides to fragment the packet into 3 fragments, determine an appropriate size for each fragment, and identify the starting byte and ending byte of each fragment (2.5 marks).
b) Calculate the fragmentation offset for each fragment (1.5 marks).
c) State whether the total number of bytes from all 4 fragments leaving the router will be greater than the initial datagram size that arrived, or less than the initial datagram size, and the reason (1 mark).

Question 3 – Congestion controls in TCP **(10 marks)**

This question affords you the opportunity to extend your thinking about congestion controls in TCP beyond the textbook and to observe what a real-world technology company, Google, is doing in this space.

First, study this Network World article that reports on Google's approach to improving congestion controls in TCP:

https://www.networkworld.com/article/3218084/lan-wan/how-google-is-speeding-up-the-internet.html?idg_eid=f32fc7aec843db7ef67d0a4f08e3322d&email_SHA1_lc=&cid=nww_nlt_networkworld_daily_news_alert_2017-08-22&utm_source=Sailthru&utm_medium=email&utm_campaign=NWW%20Daily%20AM%20Alert%202017-08-22&utm_term=networkworld_daily_news_alert_

Next, read the following more technical paper about it: https://tools.ietf.org/id/draft-cardwell-iccrg-bbr-congestion-control-00.html

After reading both articles, answer the following questions:

1. Briefly discuss the TCP congestion controls you have learned about in lectures or from our textbook by Forouzan so far this term. (2 marks)
2. Research the Internet for any other TCP congestion controls not discussed in lectures or in the textbook and list them. Choose one and discuss conceptually how it works to control congestion. Your discussion must be clear, understandable, and in your own words, but supported by the literature you refer to. You should explain technical terms you use. (3 marks)

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3. Summarize in your own words the difference(s) between the current TCP congestion controls you discussed in questions 1 & 2, and Google's BBR protocol. (5 marks)

Important: for every direct quotation you use from these two sources or any other source, you must immediately, after the quote, provide your own explanation of the quotation (for example, explain why are you quoting it, how does it help answer the question, how does it support what you are saying?) – marks will be deducted for failure to do so. In addition, correct referencing conventions must be used throughout your work using the Harvard referencing convention. Your answers will be marked on clarity, logic, relevance, use of own words and fully addressing all parts of each question.

Remember that quotations alone will not be accepted as your explanation of the questions. Quotations can support your explanations, but you must still provide the explanations yourself. Best way forward is to keep direct quotations to a minimum, and use your own words.

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TEMPLATE FOR YOUR ANSWERS

Type your answers in this section in the spaces provided. Spaces can expand as you type.

First Name:_____ **Last Name:**_____

Student ID: _____

Question Number		Mark allocated	Marks earned
Question 1: (10 marks)			
1. 2. 3. 4. 5. 6. 7. 8.	**q.8 Routing table of router R3:** Prefix | Network address | Next-hop address | Interface *Students: Do not add other networks not in the question*	1-7 1 mark each, q.8 3 marks	
Question 2: (5 marks)			
a)		2.5	
b)		1.5	
c)		1	
Question 3: (10 marks)			
1.		2	
2.		3	
3.		5	

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Total marks awarded		25 (max)	
Less late penalties if applicable			
Less plagiarism penalties if applicable			
Total marks earned			

Markers comments: