COMP202-08B
END-OF-SEMESTER TEST

DEPARTMENT:	Computer Science
PAPER TITLE:	Computer Communications
TIME ALLOWED:	50 minutes
TOTAL MARKS:	50 marks
NUMBER OF QUESTIONS IN PAPER:	Six
NUMBER OF QUESTIONS TO BE ANSWERED:	Six
VALUE OF EACH QUESTION:	The value of each question is noted.
GENERAL INSTRUCTIONS:	Answer ALL SIX questions.
SPECIAL INSTRUCTIONS:	If possible, write your answers in the spaces provided. Additional paper is available, should you require it.
CALCULATORS PERMITTED:	Yes. Non programmable.

NAME OF STUDENT: _____

1. TCP is the most widely used transport protocol in the Internet today. Four properties of TCP are that it is connection-oriented, full-duplex, reliable, and network friendly. What does each of these mean? In your answer, explain briefly how each of these is actually implemented in the TCP protocol. [8 marks]

2. TCP uses an algorithm known as slow-start to quickly find the point at which congestion is encountered.

   (a) Describe, using a time-sequence diagram, the process of slow start. Say how slow-start actually results in an exponential increase in the transmission rate. [3 marks]

   (b) What happens after a packet is lost when TCP is in slow-start mode? Be as specific as you can about what happens next. [5 marks]

3. TCP uses a set of equations to determine when it should decide when a packet has been lost. They are:

$$SRTT(k) = g * MeasuredRTT(k) + (1 - g) * SRTT(k - 1) \quad (1)$$

$$SRTT_{var}(k) = h * RTT_{var}(k) + (1 - h) * SRTT_{var}(k - 1) \quad (2)$$

$$RTO(k) = SRTT(k) + f * SRTT_{var}(k) \quad (3)$$

Normally, g is 0.125, h = 0.25, and f = 4.

Explain the rationale of each equation. [8 marks]

4. While TCP is the most commonly used transport protocol, some applications are better suited to other transport protocols. Illustrate why UDP can be a good choice by explaining why the following applications often use UDP.

   (a) real-time applications (multi-player Internet games, video conferencing). [3 marks]

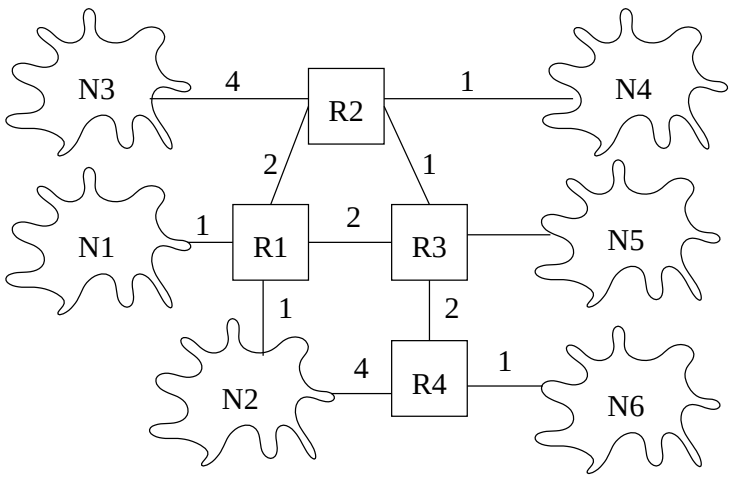
   (b) DNS. [3 marks]

5. Large networks tend to use dynamic routing protocols to organise routing.

(a) Dynamic routing protocols can be classified into two broad categories. What are they? [2 marks]

(b) Give three reasons why dynamic routing protocols are used. [3 marks]

(c) Show the table produced by running Dijkstra's algorithm on the following network, from R1's perspective. Your table will have the following columns: destination, next-hop, distance. [5 marks]



6. The Java readLine() and println() methods can be bad for network applications dealing with multiple connections concurrently, due to their blocking nature.

   (a) What is meant by the term ‘blocking’? [2 marks]

   (b) Why might the readLine method block? [2 marks]

   (c) Explain two ways of overcoming blocking, listing one advantage and disadvantage of each. Each advantage / disadvantage must be unique; i.e if you identify a disadvantage of “foo”, you cannot also use “does not foo” as an advantage. [6 marks]