COMP312-08B
MID-SEMESTER TEST

DEPARTMENT:	Computer Science
PAPER TITLE:	Communications and Systems Software
TIME ALLOWED:	90 minutes
TOTAL MARKS:	90 marks
NUMBER OF QUESTIONS IN PAPER:	Nine
NUMBER OF QUESTIONS TO BE ANSWERED:	Nine
VALUE OF EACH QUESTION:	The value of each question is noted.
GENERAL INSTRUCTIONS:	Answer ALL NINE questions.
SPECIAL INSTRUCTIONS:	If possible, write your answers in the spaces provided. Additional paper is available, should you require it.
CALCULATORS PERMITTED:	Yes

NAME OF STUDENT: _____

1. The Internet

   (a) What is heterogeneous networking?

   (b) Describe the Internet service model.

   (c) Describe the End to end principle.

[10 marks]

2. Applications

   (a) What is the purpose of an SNMP community string?

   (b) What additional security features are provided by SNMP version 3 compared to SNMP version 2?

   (c) What information would be found in a DNS A record? In an MX record?

   (d) What is the purpose of each of the following HTTP Headers?

      i. Host

      ii. Referrer

      iii. If-Modified-Since

[10 marks]

3. In as much detail as you can, show the format of a TCP header without any TCP options. Describe how each field is used.

[10 marks]

4. TCP

(a) Describe, using an example, why TCP slow start results in an exponential increase of the congestion window.

(b) A pair of hosts wish to close the TCP connection between them. Draw a time-sequence diagram that illustrates the closing sequence of packets. Your diagram must provide example TCP port numbers, TCP flags, and TCP sequence and acknowledgement numbers.

[10 marks]

5. Internet Protocol

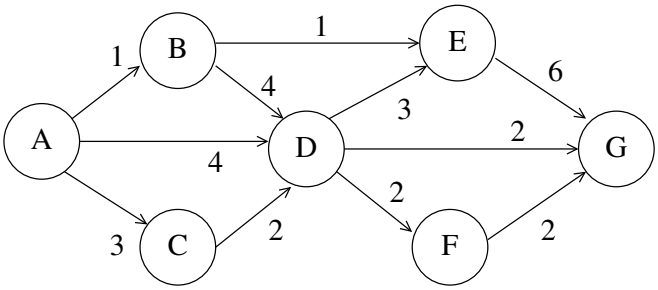
   (a) What is the maximum number of hosts which could be addressed on a network using the netmask 255.255.255.240?

   (b) To what address would a DHCP discover packet be sent?

   (c) What role is assigned by RFC3330 to the address range 127.0.0.0/8?

   (d) Describe, using an example, how Path MTU Discovery is carried out.

[10 marks]



i	Set	B	C	D	E	F	G
0	A	∞	∞	∞	∞	∞	∞

6. Routing

(a) For node A, show each step in the process of finding the shortest paths to all nodes using Dijkstra's algorithm.

(b) Describe two approaches to prevent a node running the Bellman-Ford algorithm from counting to infinity.

[10 marks]

7. IP Routing

(a) What information is passed between nodes using on the one hand a distance vector and on the other hand a link-state routing algorithm?

(b) Give one example each of a distance-vector and a link-state IGP.

(c) Why can RIP only be used in relatively small networks?

(d) What is the function of the address 224.0.0.5?

[10 marks]

8. BGP

(a) By default, how often are BGP routes readvertised?

(b) What will a BGP speaker do on receiving a Notification packet?

(c) How does a router running BGP use the AS path list of a route advertised to it from another AS?

(d) Rank the following BGP routes from most to least preferred:

Route	Prefix	Local Preference	MED	AS Path
w	130.217.1/24	120	90	9920 9917 4781 681
x	130.217.1/24	90	100	9920 4781 681
y	130.217.1/24	90	3016	681
z	130.217.1/24	100	681	

[10 marks]

9. Inter-Domain Routing

(a) How was the use by customers of PA address space intended to keep down the size of the Internet's routing table? Why does the use of multihoming by small AS's prevent this?

(b) Why will an ISP prefer to send traffic to a peer rather than a transit provider?

(c) What is the minimum set of aggregate routes which will cover the following prefixes and no others? Show your working.

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24.219.0.0/21
24.219.8.0/21
24.219.16.0/20
24.219.32.0/21
24.219.40.0/21
24.219.48.0/20
24.219.64.0/18
24.219.128.0/18
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[10 marks]