COMP202-08B MID-SEMESTER TEST

DEPARTMENT:	Computer Science
PAPER TITLE:	Computer Systems Architecture
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. One of the services provided by the link layer is error detection, and sometimes forward error correction. [5 marks]

   (a) Assuming a two-dimensional Hamming code, circle which bit was sent in error for the following message.

```
0 1 0 1 1 0 1 0
1 1 1 0 0 0 1 0
1 1 0 0 1 1 1 1
0 0 1 0 1 0 0 1
1 1 0 1 1 0 0 0
0 0 0 0 0 0 1 1
1 1 1 1 1 1 0 0
0 1 1 1 1 0 1 1
```

   (b) Explain how you determined this.

2. What is the main purpose of the Domain Name System (DNS)?

[3 marks]

3. Network applications in Java use the Sockets interface. [10 marks]

```
01  import java.net.*;
02  import java.io.*;
03  class HelloWorldServer {
04    public static void main(String args[])
05    {
06      try {
07          ServerSocket ss = new ServerSocket(1234);
08          while(true) {
09              Socket client = ss.accept();
10              PrintWriter writer = new
11                 PrintWriter(client.getOutputStream(), true);
12              BufferedReader reader = new
13                 BufferedReader(new
14                   InputStreamReader(client.getInputStream()));
15              String line = reader.readLine();
16              writer.println("You said: " + line);
17              client.close();
18          }
19      }
20      catch(Exception e) {
21          System.err.println("Exception: " + e);
22      }
23    }
24 }
```

What is the done by the instruction at (or starting at) line

(a) number 7?

(b) number 9?

(c) number 12?

(d) number 15?

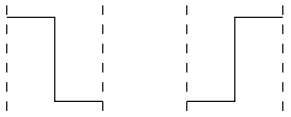
(e) number 17?

4. Manchester Encoding is used in 802.3 10baseT Ethernet to ensure regular voltage transitions. [10 marks]

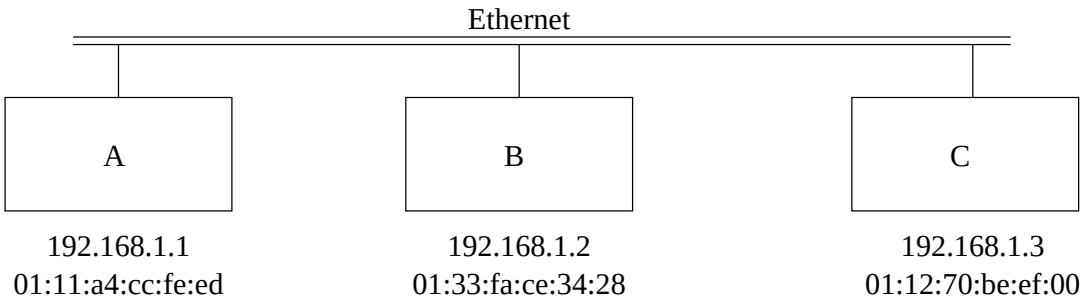
   (a) Why are regular voltage transitions useful in computer communications?

   (b) In 10baseT, what does the 10 mean? What does the T mean?

   (c) Using the following symbols, encode the message 0100110 using Manchester encoding.



5. The Address Resolution Protocol (ARP) allows a system to determine the Ethernet MAC address to send an IP packet to. [12 marks]



(a) With reference to the above diagram, say how A goes about finding out how to send a message to C. Note: there are two messages involved. For each message, say what addresses are used in the Ethernet header, and what information the payload contains.

(b) What is the purpose of an ARP cache?

(c) Identify three pieces of information that are stored in each entry in an ARP cache.

6. An IP address consists of a network prefix and a host-id suffix. Suppose an end system with an IP address of 192.168.55.19 and the following routing table: [10 marks]

Destination	Gateway	Interface
192.168.48.0/20	link #1	eth0
0.0.0.0/0	192.168.48.1	eth0

(a) Write out the subnet mask, in dotted-quad format, associated with the first entry in the table.

(b) Is 192.168.60.148 in the same network as 192.168.55.19? Show how you prove it is or is not.

(c) Draw a diagram illustrating the network topology as seen by 192.168.55.19.