

## ITS 323 – QUIZ 3 (ITA)

First name: \_\_\_\_\_ Last name: \_\_\_\_\_

ID: \_\_\_\_\_

Total Marks: \_\_\_\_\_

out of 10

### Question 1 [3 marks]

An error correcting code maps 2-bits of data into a 4 bit codeword according to the following scheme:

- 00    =>    1001
- 01    =>    0111
- 10    =>    1011
- 11    =>    1100

The Hamming distance is used to correct errors.

For the following received codewords, indicate what the receiver does. That is, either:

- Assumes NO ERROR;
- Successfully DETECTs and CORRECTs error;
- DETECT ONLY, but cannot correct;

If NO ERROR or DETECT/CORRECT, indicate the received data.

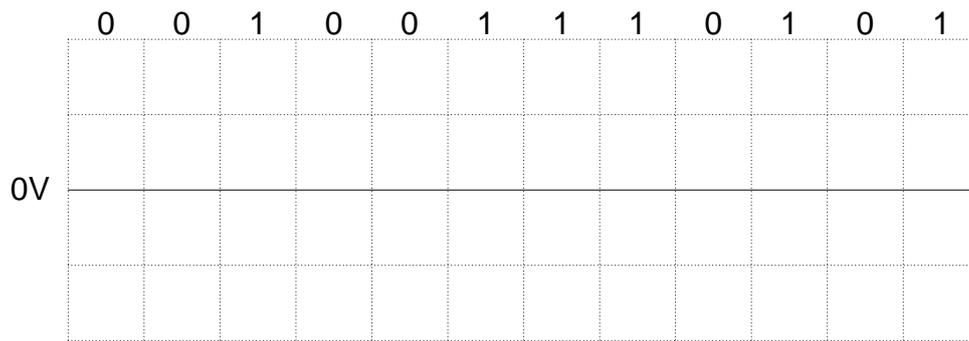
a) 0110            NO ERROR            DETECT/CORRECT            DETECT ONLY  
      Received Data: \_\_\_\_\_

b) 1011            NO ERROR            DETECT/CORRECT            DETECT ONLY  
      Received Data: \_\_\_\_\_

c) 0011            NO ERROR            DETECT/CORRECT            DETECT ONLY  
      Received Data: \_\_\_\_\_

**Question 2** [2 marks]

Draw the analog signal used to transmit the digital data below if Amplitude Shift Keying is used.

**Question 3** [2 marks]

A single bit even parity check is applied to an 8-bit data frame. For the following cases of errors, indicate if the receiver can detect the error or not (circle the answer):

- |   |        |            |
|---|--------|------------|
| a) The last bit of the data frame is in error         | DETECT | NOT DETECT |
| b) The last two bits of the data frame are in error   | DETECT | NOT DETECT |
| c) The last three bits of the data frame are in error | DETECT | NOT DETECT |
| d) The parity bit is in error                         | DETECT | NOT DETECT |

**Question 4** [3 marks]

What is the maximum throughput of the Stop and Wait Flow Control protocol.

You can assume:

- Data rate is 1Mb/s
- Data frame size is 5,000 bits
- ACK size is 100 bits
- Propagation time is 15msec
- No processing delay