



- c) The highest frequency component of an analog data is 2MHz. If Pulse Code Modulation with each code represented as 4 bits is used, following the sampling theorem, the data rate should be:
- 250kb/s
  - 1Mb/s
  - 2Mb/s
  - 4Mb/s
  - 8Mb/s
  - 16Mb/s
  - 32Mb/s
- d) A receiver using the sliding window mechanism has a buffer size of 63000 bytes. Assume each frame is 1000 bytes in length. How many bits should be used to represent the sequence number carried in the header?
- 1 bit
  - 2 bits
  - 5 bits
  - 6 bits
  - 7 bits
  - 63 bits
  - 64 bits

**Question 3** [3 marks]

What is the propagation time if using Stop and Wait Flow Control protocol gives a maximum throughput of 125Mb/s.

You can assume:

- Data rate is 1Gb/s
- Data frame size is 9000 bits of data plus 1000 bits of header
- ACK size is 2000 bits
- No processing delay

**Question 4** [1 mark]

Go-Back-N ARQ with a  $k$  bit sequence number limits the maximum window size to  $2^k-1$ . Explain a problem that may occur if the maximum window size was *greater than*  $2^k$  (e.g.  $2^k+1$ ). (A diagram may help with your explanation).