B38CN: Introduction Communications and Networks
Tutorial 4 (Chapter 3)

1. Explain the difference between unacknowledged connectionless service and acknowledged connectionless service in the data link layer. How do the protocols that provide these services differ?

2. Explain the difference between Go-Back-N Automatic Repeat request (ARQ) and Selective Repeat ARQ.

3. The following character encoding is used in a data link protocol:
   C: 00111011; D: 11001110; ESC: 11110000; FLAG: 01111110
   Show the binary bit sequence transmitted for the five-character frame: C FLAG ESC FLAG D when each of the following framing methods is used:
   1) Flag bytes with byte stuffing.
   2) Starting and ending flag bytes, with bit stuffing.

4. A binary bit string "1010101" is to be encoded using an odd-parity Hamming code (11, 7). What is the binary value after encoding?

5. A bit stream 101011 is transmitted using the standard CRC method. The generator polynomial is x^3+x+1. Show the actual bit string transmitted. Suppose the bit string 110111011 is received after transmission. Is there any transmission error? If so, show how the errors are detected at the receiver's end.

6. Suppose we use Stop-and-Wait ARQ protocol to transmit frames that are 120 bits long over a channel that has a bit rate of 3 kbps and a propagation delay of 30 msec. Let us neglect the time for the receiver to process frames and prepare acknowledgement. What is the transmission efficiency of the Stop-and-Wait ARQ protocol.

7. Explain the differences between PPP and HDLC frame formats.