Q.1 Frames of 1000 bits are sent over a 10^6 bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link).

What is the minimum number of bits (i) that will be required to represent the sequence numbers distinctly? Assume that no time gap needs to be given between transmission of two frames.

Q.2 The message 11001001 is to be transmitted using the CRC polynomial $x^3 + 1$ to protect it from errors. Determine the transmitted message.

Q.3 If the frame to be transmitted is 1101011011 and the CRC polynomial to be used for generating checksum is $x^4 + x + 1$, then what is the transmitted frame?

Q.4 A bit-stuffing based framing protocol uses an 8-bit delimiter pattern of 01111110. If the output bit-string after stuffing is 01111100101, then determine the input bit-string.

Q.5 How many 8-bit characters can be transmitted per second over a 9600 baud serial communication link using asynchronous mode of transmission with one start bit, eight data bits, two stop bits, and one parity bit?

Q.6 Data transmitted on a link uses the following 2D parity scheme for error detection: Each sequence of 28 bits is arranged in a 4×7 matrix (rows r0 through r3, and columns d7 through d1) and is padded with a column d0 and row r4 of parity bits computed using the Even parity scheme. Each bit of column d0 (respectively, row r4) gives the parity of the corresponding row (respectively, column). These 40 bits are transmitted over the data link.

	d_7	d_6	d_5	d_4	d_3	d_2	d_1	d_0
r_0	0	1	0	1	0	0	1	1
r_1	1	1	0	0	1	1	1	0
r_2	0	0	0	1	0	1	0	0
r_3	0	1	1	0	1	0	1	0
r_4	1	1	0	0	0	1	1	0

The table shows data received by a receiver and has n corrupted bits. What is the minimum possible value of n?

Q.7 In CRC if the data unit is 100111001 and the divisor is 1011 then what is dividend at the receiver?