

78918

Q.No. 5 b)

$$b) \quad n=7 \quad k=4 \quad n-k=3$$

$$g(x) = x^3 + x + 1$$

$$c(x) = x^{n-k} \cdot D(x) \oplus m(x)$$

$$m(x) = \text{Rem} \left[ \frac{x^{n-k} \cdot D(x)}{g(x)} \right]$$

$$D = 1100$$

$$D(x) = x^3 + x^2$$

$$x^3 \cdot D(x) = x^6 + x^5$$

$$\begin{array}{r} x^3 + x + 1 \overline{) x^6 + x^5} \\ x^6 + x^4 + x^3 \\ \hline \end{array}$$

$$x^5 + x^3 + x^2$$

$$\begin{array}{r} x^5 + x^4 + x^3 \\ x^5 + x^3 + x^2 \\ \hline \end{array}$$

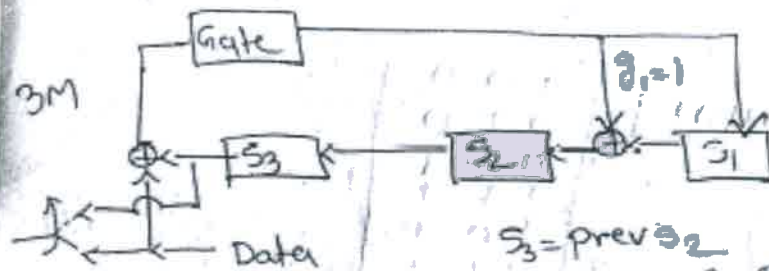
$$x^4 + x^2$$

$$\begin{array}{r} x^4 + x^2 \\ x^4 + x^2 + x \\ \hline \end{array}$$

5M

$$c(x) = x^6 + x^5 + x$$

$$C = 1100010$$



$$S_3 = \text{prev } S_2$$

$$S_2 = \text{prev } S_1 \oplus \text{prev } S_3 \oplus \text{Data}$$

$$S_1 = \text{Data} \oplus \text{prev } S_3$$

2M.

$S_3$	$S_2$	$S_1$	
0	0	0	1
0	1	1	1
1	0	1	0
0	0	1	0
1	1	0	0

1100010

Q. 2 b

Solution:

We know that the entropy of the quaternary source is given as

$$H \zeta = \sum_{k=0}^3 p_k \log_2 \left( \frac{1}{p_k} \right) = H \zeta = p_0 \log_2 \left( \frac{1}{p_0} \right) + p_1 \log_2 \left( \frac{1}{p_1} \right) + p_2 \log_2 \left( \frac{1}{p_2} \right) + p_3 \log_2 \left( \frac{1}{p_3} \right)$$

$$H \zeta = 0.5 \log_2 \left( \frac{1}{0.5} \right) + 0.25 \log_2 \left( \frac{1}{0.25} \right) + 0.125 \log_2 \left( \frac{1}{0.125} \right) + 0.125 \log_2 \left( \frac{1}{0.125} \right)$$

$$H \zeta = 1.75 \text{ bits} \quad \text{Ans.}$$