Encoder circuit for LBC (n,k)

Lec 37: Encoder for (n, k) Linear Block code

Q Draw the encoder circuit for (7,4) Hamming Code with Generator matrix given by

$$G = \left[\begin{array}{cccc:ccc} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right]$$

$m_1\ m_2\ m_3\ m_4\ \ P_1\ P_2\ P_3$.

$$[P_1\ P_2\ P_3] = [m_1\ m_2\ m_3\ m_4] \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{pmatrix}.$$

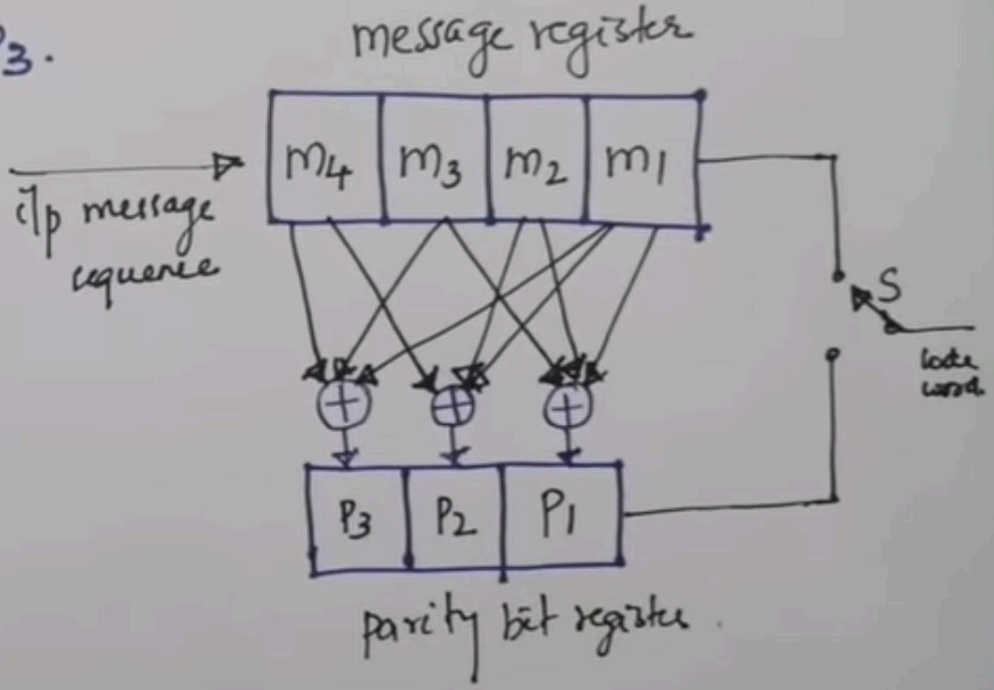
$P_1 = m_1 \oplus m_2 \oplus m_3$.

$P_2 = m_1 \oplus m_2 \oplus m_4$.

$P_3 = m_1 \oplus m_3 \oplus m_4$.

Format of codeword

$m_1\ m_2\ m_3\ m_4\ P_1\ P_2\ P_3$.



steps involved in the syndrome decoding

step 1 :- find $S = r H^T$.

step 2 :- Check the row of H^T which is same as S.
obtained syndrome S.

step 3 :- If p^{th} row is obtained, then p^{th} bit is in error
Now write the corresponding error vector e

step 4 :- Correct code vector $C = r \oplus e$.

Syndrome Decoder for (n, k) Block code