Generator Matrix

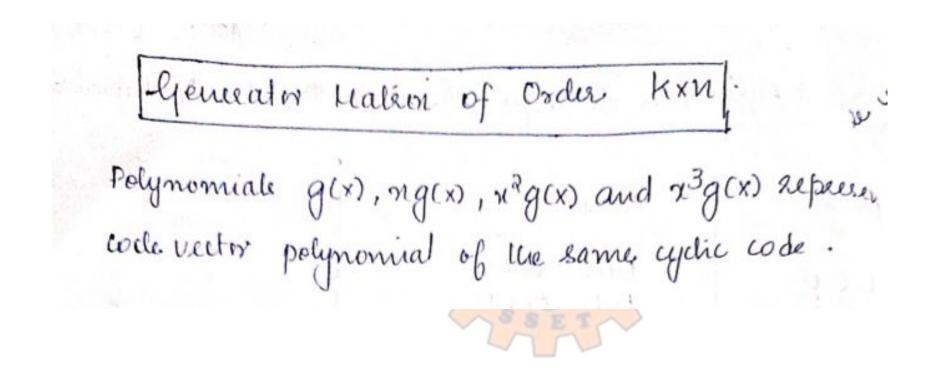


Fig.:
$$g(x) = 1 + x + x^{3} \quad (n_{1}h) = (1,1).$$

$$= 1.1 + 1.x + 0.x^{2} + 1.x^{3} + 0.x^{4} + 0.x^{5} + 0.x^{6}.$$
The code ned or corresponding to $g(x)$ is 1101000 .

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

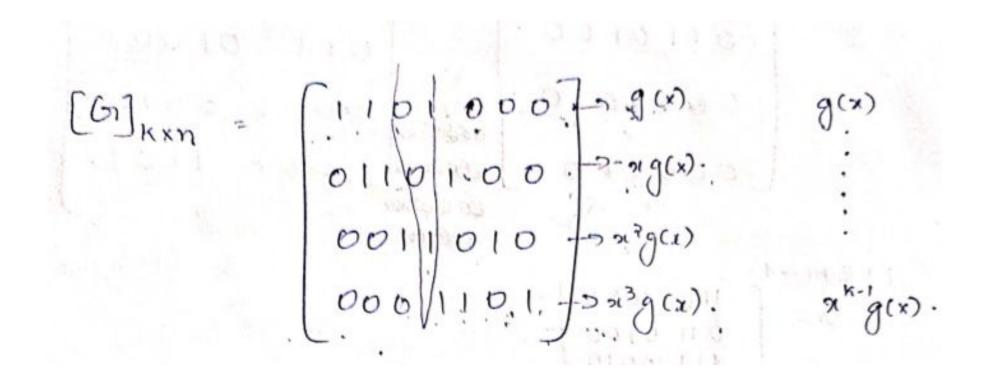
 $= x + x^3 + x^4$.

$$x^{2}g(x) = x^{2}(1+x+x^{3})$$

: code meder Corresponding to arginic 0011010.

: code ued or lorresponding to n3 gcx2 is 0001101

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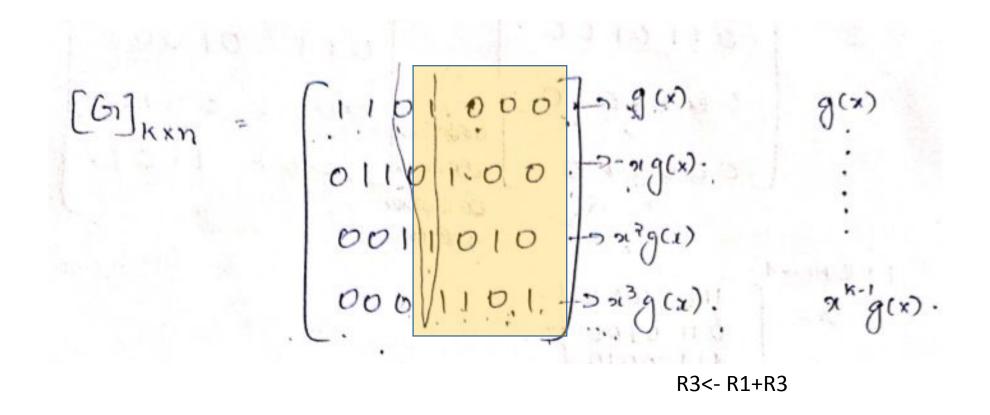


The generalis matrine or is not in systematic form, le cannot be nienalised in [P[IK] = PET [P:I4] from.

→ The last of elemente of 1st and 2nd 2nd 2000 of [GI] Consider with 1st. 2 20ws of 7k. But not the last Rours.

3 il ean be toansformed into a systematic form. by adding fast sow to 3rd sow and placing the sesult in third sow.

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$$\begin{bmatrix}
G \\
9
\end{bmatrix} = \begin{bmatrix}
1101000 \\
00110100
\end{bmatrix}$$

$$\begin{bmatrix}
011 & 0100 \\
00011 & 0100
\end{bmatrix}$$

$$C = \begin{bmatrix}
110 & 1000 \\
011 & 0100
\end{bmatrix}$$

$$R3 = R1 + R3$$

$$R4 = R1 + R2 + R4$$

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Parity Check matrix

The rows of H matrix are

$$H = n^{k}h(x^{-1}) \times {}^{k+1}h(x^{-1}) \dots \times {}^{n-1}h(x^{-1})$$
we know that
$$n^{m}+1 = g(n) \cdot h(n) \cdot$$

$$for (7,4) \cdot \text{cyclic code}, \text{ we have } n=7.$$

$$n^{7}+1 = g(n) \cdot h(n) \cdot$$

paouty check polynomial
$$-h(\pi) = \pi^{\frac{7}{4}} + 1$$

$$g(\pi)$$

$$\pi^{\frac{3}{4}} + \pi^{\frac{2}{4}} + 2 + 1$$

$$\pi^{\frac{5}{4}} + \pi^{\frac{5}{4}} + \pi^{\frac{9}{4}}$$

$$\pi^{\frac{5}{4}} + \pi^{\frac{9}{4}} + \pi^{\frac{9}{4}}$$

$$\pi^{\frac{1}{4}} + \pi^{\frac{3}{4}} + \pi^{\frac{2}{4}} + 1$$

$$\pi^{\frac{3}{4}} + \pi^{\frac{3}{4}} + \pi^{\frac{9}{4}}$$

$$\pi^{\frac{3}{4}} + \pi^{\frac{1}{4}}$$

$$\pi^{\frac{3}{4}} + \pi^{\frac{1}{4}}$$

$$\pi^{\frac{3}{4}} + \pi^{\frac{1}{4}}$$

logy

Reciprocal of
$$\mathcal{R}(\pi)$$
 is defined as $\pi^k \mathcal{R}(\pi^i)$.

This polynomial is also a factor of (1+ π^n).

Let us consider $\pi^t \mathcal{R}(\pi^i)$ for a (7,4) cyclic code.

 $\mathcal{R}(\pi) = 1+\pi^2+\pi+\pi^4$
 $\mathcal{R}(\pi^i) = 1+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

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$$\alpha^{4} \cdot h(\alpha^{2}) = \alpha^{4} \left(1 + \frac{1}{n} + \frac{1}{n^{2}} + \frac{1}{n^{4}} \right).$$

$$\chi^{5} \mathcal{N}(\pi) = \pi^{5} \left(1 + \frac{1}{n} + \frac{1}{n^{2}} + \frac{1}{n^{4}} \right).$$

$$= \chi^{5} + \pi^{3} + \pi^{4} + \pi.$$

$$\text{Cocle is } \left[0 + 0 + 1 + 0 \right].$$

$$\chi^{6} \mathcal{N}(\pi) = \chi^{6} \left(1 + \frac{1}{n^{2}} + \frac{1}{n^{4}} + \frac{1}{n^{4}} \right).$$

$$= \pi^{6} + \pi^{5} + \chi^{4} + \chi^{2}.$$

$$\text{code is } \left[0 + 0 + 1 + 1 \right].$$

$$\text{code is } \left[0 + 0 + 1 + 1 \right].$$

H is a
$$(n-k)\times n$$
 madrix.
H = $\begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}$ $uot = of form \begin{bmatrix} T_{n-k} & p^T \end{bmatrix}$
 $0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}$.

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