

Câu 1: $m_1 m_2 \rightarrow G G G G G$

$$m_1 = G_1 = G$$

$$G_2 = G_3 = m_2 \rightarrow G \text{ 2H}$$

$$G_5 = m_1 + m_2$$

$$C = m G = [m_1 \ m_2] G$$

Câu 1: $m_1 m_2 \rightarrow G_1 G_2 G_3 G_4 G_5$

$$G_1 = G_4 = m_1$$

$$G_2 = G_3 = m_2 \rightarrow G \text{ 2H}$$

$$G_5 = m_1 + m_2$$

$$G = [I_2 : P] \Leftrightarrow H = [P^T : I_3]$$

Giả sử $P = \begin{bmatrix} P_{00} & P_{01} & P_{02} \\ P_{10} & P_{11} & P_{12} \end{bmatrix} \rightarrow G = \begin{bmatrix} 1 & 0 & P_{00} & P_{01} & P_{02} \\ 0 & 1 & P_{10} & P_{11} & P_{12} \end{bmatrix}$

$$C = m G = [m_1 \ m_2] G = [m_1 \ m_2] \begin{bmatrix} 1 & 0 & P_{00} & P_{01} & P_{02} \\ 0 & 1 & P_{10} & P_{11} & P_{12} \end{bmatrix}$$

$$= [m_1 \ m_2, P_{00}m_1 + P_{10}m_2, P_{01}m_1 + P_{11}m_2, P_{02}m_1 + P_{12}m_2]$$

$$= [m_1, m_2, m_2, m_1, m_1 + m_2] (= [G_1 G_2 G_3 G_4 G_5])$$

$$\Rightarrow P_{00}m_1 + P_{10}m_2 = m_2 \Rightarrow \begin{cases} P_{00} = 0 \\ P_{10} = 1 \end{cases}$$

$$\Rightarrow P_{01}m_1 + P_{11}m_2 = m_1 \Rightarrow \begin{cases} P_{01} = 1 \\ P_{11} = 0 \end{cases}$$

$$\Rightarrow P_{02}m_1 + P_{12}m_2 = m_1 + m_2 \Rightarrow \begin{cases} P_{02} = 1 \\ P_{12} = 1 \end{cases}$$

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$$\Rightarrow G_{2 \times 5} = \left[\begin{array}{ccc|cc} 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 1 \end{array} \right]$$

$$\rightarrow H_{3 \times 5} = \left[\begin{array}{ccc|cc} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 \end{array} \right]$$

Câu 2: Mã Hamming(7,3) phát hiện & sửa 1 lỗi đơn trong 1 từ mã 7 bit.

Số bit kiểm soát lỗi: ~~l~~ $l - k = 4$ (bit)

Số bit truyền dữ liệu: $k = 3$ (bit)

Câu 3: $G_{3 \times 6} = \left[\begin{array}{ccc|cc} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{array} \right]$

a) $G_{3 \times 6} = [I_3 | P] \Leftrightarrow H = [P^T | I_3]$

$$H_{3 \times 6} = \left[\begin{array}{ccc|ccc} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 \end{array} \right]$$

b) $\text{cột } 1 + \text{cột } 2 + \text{cột } 4 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

$\Rightarrow d_0 = 3$

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