

通信原理第 11 章作业

11-7 解: 许用码组: $A = [a_6 a_5 a_4] \cdot G$
 $[a_6 a_5 a_4] = [000], [001], [010], [011], [100], [110], [100], [111]$

\therefore 许用码组: 0000000 1001110 0011101 1010011
 0100111 1101001 0111010 1110100

G 是典型阵 $G = \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 & 1 \end{array} \right] = [I_k Q]$

$$P = Q^T = \left[\begin{array}{ccc|ccc} 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 \end{array} \right]^T = \left[\begin{array}{ccc|ccc} 1 & 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 1 \end{array} \right]$$

监督矩阵 $H = [P I_r] = \left[\begin{array}{ccc|ccc} 1 & 0 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{array} \right]$

11-8 解: (7,4) 循环码的生成多项式 $g(x)$ 应是 (x^7+1) 的 7-4=3 次因子

$$x^7+1 = (x+1)(x^3+x+1)(x^3+x^2+1)$$

可选取 x^3+x+1 或 x^3+x^2+1

给定的全部码组中有 0001011, \therefore 选 x^3+x+1 . $g(x) = x^3+x+1$

$$G(x) = \begin{bmatrix} x^3 g(x) \\ x^2 g(x) \\ x g(x) \\ g(x) \end{bmatrix} = \begin{bmatrix} x^6 + x^4 + x^3 \\ x^5 + x^3 + x^2 \\ x^4 + x^2 + x \\ x^3 + x + 1 \end{bmatrix} \Rightarrow G = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

11-9 解: $G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix} = [I_k Q]$

$$P = Q^T = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}^T = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

典型监督矩阵 $H = [P I_r] = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$