编码 1117 作业

November 2022

1 第一题

8.5

design distance = 5

31= 25 -1

$\therefore g(x) = lcm\{M^{(a)}(x), M^{(a+1)}(x), M^{(a+2)}(x), M^{(a+3)}(x)\}$

Because this is a BCH code, so $a = 1$

2 第二题

8.16

It is obvious that $\alpha = 2$ is a primitive element of F_{11}

$$\begin{aligned}\therefore g(x) &= (x-2)(x-2^2)(x-2^3)(x-2^4)(x-2^5)(x-2^6)\\ &= x^6 + 6x^5 + 5x^4 + 7x^3 + 2x^2 + 8x + 2\end{aligned}$$

$$G(x) = \begin{bmatrix} 2 & 8 & 2 & 7 & 5 & 6 & 1 & 0 & 0 & 0 \\ 0 & 2 & 8 & 2 & 7 & 5 & 6 & 1 & 0 & 0 \\ 0 & 0 & 2 & 8 & 2 & 7 & 5 & 6 & 1 & 0 \\ 0 & 0 & 0 & 2 & 8 & 2 & 7 & 5 & 6 & 1 \\ 1 & 0 & 0 & 0 & 2 & 8 & 2 & 7 & 5 & 6 \\ 6 & 1 & 0 & 0 & 0 & 2 & 8 & 2 & 7 & 5 \end{bmatrix}$$

$$\begin{aligned}h(x) &= (x^{10} - 1)/g(x)\\ &= (x^{10} - 1)/(x^6 + 6x^5 + 5x^4 + 7x^3 + 2x^2 + 8x + 2)\\ &= x^4 + 5x^3 + 9x^2 + 2x + 5\end{aligned}$$

$$H(x) = \begin{bmatrix} 1 & 5 & 9 & 2 & 5 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 5 & 9 & 2 & 5 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 5 & 9 & 2 & 5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 5 & 9 & 2 & 5 & 0 & 0 \end{bmatrix}$$

$\therefore d = 5$