

# SC461- Coding Theory and Applications

Home Work 6

Spring 2014

- (1) Using 3-cyclotomic cosets modulo 13, if possible construct a BCH code over  $GF(3)$  of length  $n = 13$  and design distance 3.
- (2) Using [15, 7] double error correcting BCH code decode the received vector  $\mathbf{r} = 100000001000000$ .
- (3) Consider a triple error-correcting Reed-Solomon code with symbols from  $GF(16)$  with generator polynomial  $g(x)$  has  $\alpha, \alpha^2, \alpha^3, \alpha^4, \alpha^5, \alpha^6$  as all its roots ( $\alpha$  is the root of the primitive polynomial  $g(x)$ ). Find its parameters  $[n, k, d]$ .
- (4) Check if the convolutional codes generated by the following matrices  $G_1$  and  $G_2$  are same or different ?

$$G_1 = \begin{bmatrix} 1 & 1 + D + D^2 & 1 + D^2 & 1 + D \\ 0 & 1 + D & D & 1 \end{bmatrix} \text{ and } G_2 = \begin{bmatrix} 1 & D & 1 + D & 0 \\ 0 & 1 + D & D & 1 \end{bmatrix}.$$

Encode (11010, 10111) using  $G_2$ .

- (5) Factor  $x^{13} - 1$  over  $GF(3)$ .