

FAULT TOLERANT SYSTEMS CS60058

problem set 2

March 1, 2016

Submission Guidelines : Solve the following numerical problems in pen and paper. Submit it tomorrow at the end of the class. In your submission clearly mention name and roll number. (5)

1. Show that the Hamming distance of an M -of- N code is 2. (10)
2. Derive all codewords for the separable 5-bit cyclic code based on the generating polynomial $X + 1$ and compare the resulting codewords to those for the non-separable code. (5)
3. (a) Show that if the generating polynomial $G(X)$ of a cyclic code has more than one term, all single bit errors will be detected. (5)
(b) Show that if $G(X)$ has a factor with three terms, all double bit errors will be detected. (5)
(c) Show that if $G(X)$ has $X + 1$ as a factor, all odd numbers of bit errors will be detected. That is, if $E(X)$ contains an odd number of terms (errors) it does not have $X + 1$ as a factor. Also show that CRC-16 and CRC-CCITT contain $X + 1$ as a factor. What are the error detection capabilities of these cyclic codes? (5+5+5)