

Department of Electronics & Communication Engineering.
Bundelkhand Institute of Engineering & Technology, Jhansi.

Assignment Sheet 7
 Information Theory and Coding (DC 13)

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Due Date :

Problems : 10

1. For a (6,3) symmetric linear block code the three parity check bits X_1 , X_2 & X_3 are formed from the following combination equation.

$$X_1 = Y_1 \oplus Y_3$$

$$X_2 = Y_1 \oplus Y_2 \oplus Y_3$$

$$X_3 = Y_1 \oplus Y_2$$

\oplus is convolution symbol.

Find the following:

- (A) Generator Matrix
 (B) Construction of all possible code word
 (C) Let receive code vector is 010111. Decode this received code vector by finding the error and transmitted data bits.

2. Explain prefix condition.

Consider the following codes :

Symbol	Code 1	Code 2	Code 3	Code 4
A	0	0	0	00
B	10	01	01	01
C	110	001	011	10
D	1110	0010	110	110
E	1111	0011	111	111

Identify the prefix code and construct their individual decision trees.

3. A parity check matrix is

$$H = \begin{pmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{pmatrix}$$

Find

- (A) Generator Matrix
 (B) Find the code vector that start with 101

4. For a Hamming Code of (7,4)
 $G(x) = 1 + x + x^3$
Code word = 01110011
Received word = 0101001
Determine the syndrome polynomial $S(x) = e(x)$ where $e(x)$ is the error polynomial.
5. A source has five equal likely output message . Determine a Shannon Fano code the source and determine the efficiency of the resulting code.
6. Repeat the above problem for the Huffman code and compare the results.
7. Write the mathematical expression for the entropy of continuous signals and explain it.
8. What is entropy maximization.
9. Draw the Huffman code for the following symbols.
 $P(A) = 0.22, P(B) = 0.2, P(C) = 0.18, P(D) = 0.15, P(E) = 0.1, P(F) = 0.08, P(G) = 0.05$ & $P(H) = 0.02$.
Find out the efficiency and redundancy of the code.
10. Do the above problem for $D = 4$ (D-ary digits to match the channel).