St.Joseph's College of Engineering-Chennai 119

CS 6304-ANALOG AND DIGITAL COMMUNICATION

Assignment-4

Part-A

1. Define Entropy.
2. State the Channel capacity theorem.
3. Define Mutual Information and state its properties.
4. State Source coding theorem[Shannon's I theorem] and channel coding[Shannon's II]theorem.
5. What are the different types of error control codings?
6. Differentiate between Block codes and Convolution codes.
7. Define Syndrome and state its properties.
8. Define Hamming distance and Hamming Weight.

Part-B

1.A discrete memory less source has 7 symbols with probability of occurrence as shown below. {0.125,0.125,0.25,0.25,0.125,0.0625,0.0625}State the Shannon fano coding algorithm and construct the Shannon fano codes for the above symbols. Calculate the efficiency.

2.A discrete memory less source has 5 symbols x1, x2, x3, x4 and x5 with probabilities 0.4, 0.19, 0.16, 0.15 and 0.1 respectively attached to every symbol.
 (i) State the Huffman coding algorithm.
 (ii) Implement the Huffman coding algorithm and calculate the code words for the message.
 (iii) Also find the average code word length and efficiency.
 (iv) Compare its efficiency with Shannon fano coding.

3.The Parity check matrix of (7,4) linear block code is given by

$$H= \begin{bmatrix} 1110\ 100 \\ 1101\ 010 \\ 1011\ 001 \end{bmatrix}$$

 (i) Find the generator matrix.
 (ii) List all code vectors.
 (iii) Find d_{min}
 (iv) How many errors can be detected and corrected.

4.Consider the generation of a (7,4) cyclic codes by the generator polynomial $g(x)=1+x+x^3$.

 (i) Calculate the code word for the message sequence (1001) and construct systematic generator matrix 'G'.
 (ii) Draw the diagram of encoder and syndrome calculator generated by the polynomial.