Code No: D9302

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II SEMESTER EXAMINATIONS, APRIL/MAY 2012
CODING THEORY AND TECHNIQUES
(SYSTEMS & SIGNAL PROCESSING)

Time: 3hours   Max.Marks:60

Answer any five questions
**All questions carry equal marks**
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1.a)   Derive the condition for the Maximum entropy of a Discrete Source transmitting Three messages, independent of each other, with probabilities P_1, P_2 and P_3. Find the value of the Maximum Entropy.

   b)   Verify that the Mutual Information $I(X, Y) = H(X)-H(X/Y)$, where X and Y are the Transmitter and Receiver respectively, and H is the Corresponding Entropy.

2.a)   What is a Binary Symmetric Channel? Explain.

   b)   Find the Hamming Distance of the (5, 3) Linear Block Code with the Generator Matrix is

$$\begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

3.a)   Find the Standard Array for a (6, 3) Linear Block Code, whose generator matrix is

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

   b)   Find the syndrome matrix of the block code.

4.   Design a Systematic Cyclic Encoder for a (7, 3) code, with a generator polynomial $g(x) = x^4 + x^3 + x^2 + 1$ and find the code word for the data word 110.

5.   Construct the decoding Table for a single error correcting (7, 4) Cyclic code, whose generator polynomial is $g(x) = x^3 + x^2 + 1$.

6.   Find and plot the State Diagram of the following Convolutional Encoder.
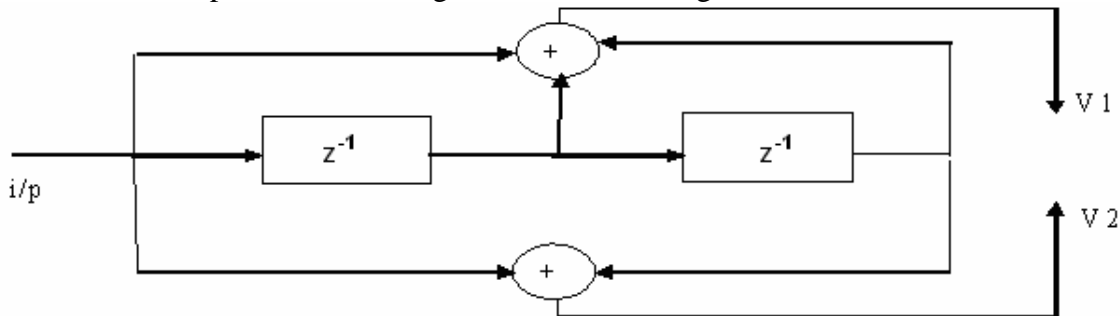
7.a)   Explain about the Principle of Maximum Likelihood Decoding of Convolutional Codes.

   b)   Discuss about Convolutional Interleaving.

8.   Generate the Field elements of GF(2^3), whose irreducible polynomial is $x^3 + x + 1$.

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