

**B. TECH. SEM -VI (E & TC ENGG.) (2014 COURSE) (CBCS)
: WINTER - 2017**

SUBJECT : INFORMATION THEORY & CODING

Day : **Friday**
Date : **24/11/2017**

Time : **10.00 AM TO 01.00 PM**
Max. Marks : 60

W-2017-2249

N.B.:

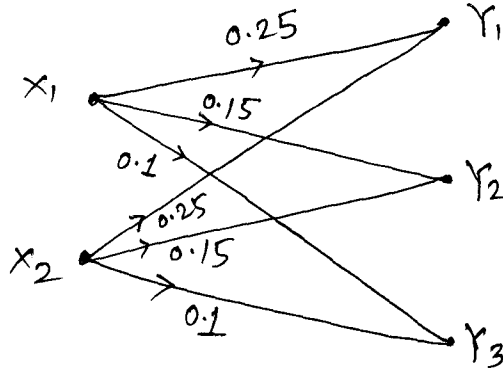
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

- Q.1** a) State and explain properties of Information. [05]
b) Write a note on: Discrete Memoryless Source. [05]

OR

Determine the Lempel-Ziv code for the following bit stream [10]
01001111100101000001010101100110000.
Recover the original sequence from the encoded stream.

- Q.2** Find the mutual information for the channel shown in figure. [10]



OR

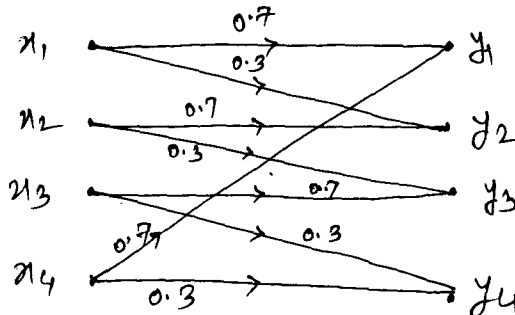
Write short note: [10]

- a) Joint entropy
- b) Conditional entropy

- Q.3** a) A 2KHz channel has signal to Noise ratio of 24dB cal. maximum capacity of channel. [05]
b) Explain rate distortion theory. [05]

OR

Find the capacity of channel shown in figure. [10]



P.T.O.

Q.4 For a (6, 3) block code, the received code word is [111011]. Is this code word correct? If not then correct it using syndrome decoding, coefficient matrix is given by: [10]

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

OR

A (6, 3) code the generator matrix G is given by [10]

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

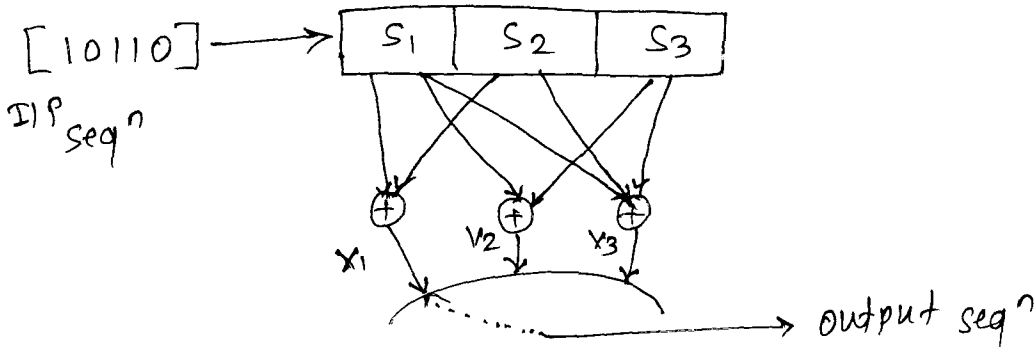
- a) Draw the encoder.
- b) Obtain syndrome.
- c) Locate the incorrect bit of [100011].

Q.5 Find the generator matrix and parity check matrix. For systematic (7, 3) cyclic code. The generator polynomial is $g(x) = 1 + x + x^2 + x^3$. [10]

OR

Obtain the generator polynomial for a BCH code with a block length 15. Assume the primitive polynomial $p(x) = x^2 + x + 2$ over GF(4) should be able to correct at least 1 error. [10]

Q.6 For the convolutional encoder shown in figure. [10]



Draw code tree, state diagram, trellis diagram. Determine output sequence.

OR

Generator vector for a rate 1/3 convolutional encoder are: [10]

$$g_1 = [1 \ 0 \ 0], \quad g_2 = [1 \ 0 \ 1], \quad g_3 = [1 \ 1 \ 1].$$

- a) Draw encoder diagram.
- b) Draw trellis diagram.
- c) Using trellis, find code vector if message is [101100].

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