

09/05/2016

6E6095

Roll No. _____

Total No of Pages: **4**

6E6095

B. Tech. VI-Sem. (Main & Back) Exam., April/May-2016
Information Technology
6IT5A Information Theory and Coding

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks (Main & Back): 26

Instructions to Candidates:-

Attempt any **five** questions, selecting **one** question from **each** unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

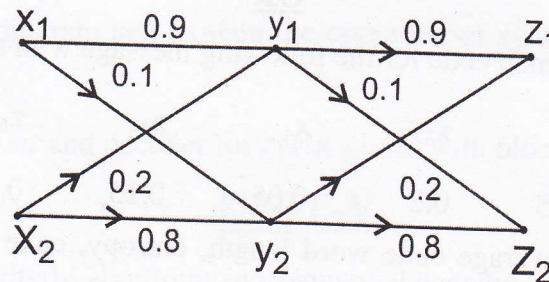
Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. NIL

2. NIL

UNIT-I

Q.1 (a) Two binary channel are connected is cascade as shown is figure below



(i) Find the ones all channel matrix of the resultant channel, and draw the resultant equivalent channel diagram.

[4]

(ii) Find $P(z_1)$ and $P(z_2)$ when $P(x_1) = P(x_2) = 0.5$ [4]

(b) Define channel and also explain its types. [8]

OR

Q.1 (a) Define the following

(i) Information [2]

(ii) Entropy [2]

(iii) Information Rate [2]

(iv) Joint entropy [2]

(b) A discrete source units one of five symbols once every millisecond with probabilities $1/2, 1/4, 1/8, 1/16$ and $1/16$ respectively. Determine the source entropy and information rate. [8]

UNIT-II

Q.2 (a) A DMS X has four symbols x_1, x_2, x_3 and x_4 with $P(x_1) = 1/2, P(x_2) = 1/4$ and $P(x_3) = P(x_4) = 1/8$. Construct a Shannon Fano code for X ; show that this code has the optimum property that $\eta_i = L(x_i)$ and the code efficiency is 100 percent. [8]

(b) Explain Lempel – Ziv algorithm with example. [8]

OR

Q.2 Determine the Huffman code for the following message with their [16]

x_1	x_2	x_3	x_4	x_5	x_6	x_7
0.05	0.15	0.2	0.05	0.15	0.3	0.1

and also find the average code word length, entropy, code efficiency. Compare the result with entropy.

UNIT-III

- Q.3 (a) What do you mean by linear block code? Explain. [4]
(b) Given a (7, 4) linear block code whose generator matrix is given by [12]

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

- (i) Find all the code words
(ii) Find the parity check matrix.

OR

- Q.3 (a) Differentiate between systematic and non-systematic codes. Also give suitable examples. [8]
(b) Explain the Repeated codes with an example. [8]

UNIT-IV

- Q.4 (a) For systematic (7, 4) cyclic code, determine the generator matrix and parity check matrix. [12]
Given : $G(P) = P^3 + P + 1$
(b) Write a short note on Galois field polynomial. [4]

OR

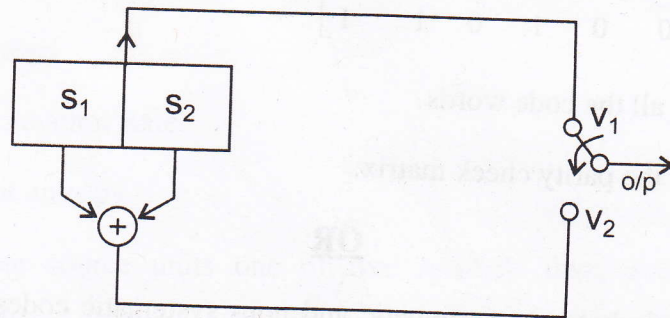
- Q.4 (a) Give block diagram and explain the operation of syndrome calculator for cyclic codes. [8]
(b) Design encoder and decoder for cyclic codes with block diagram. [8]

UNIT-V

- Q.5 (a) Explain the viterbi algorithm and sequential decoding of convolutional codes. [8]
(b) What are code tree, code trellis and state diagram for convolutional encoders? [8]

OR

- Q.5 (a) Explain the difference between convolutional codes and block codes with example. [6]
- (b) Draw the state diagram, the tree diagram and trellis diagram for the convolutional encoders of figure below. [5]



- (c) Find the free distances of this convolutional code. [5]
