

Total No. of Questions : 6]

SEAT No. :

P19

[Total No. of Pages : 2

APR - 18/TE/Insem. - 21

T.E. (E & TC)

INFORMATION THEORY AND CODING TECHNIQUES

(2012 Course) (Semester - II)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Assume suitable data, if necessary.*
- 3) *Use of calculators is allowed.*

Q1) a) An 8 bit PCM system generates 8,000 samples per second. If the quantized samples produced by the systems are equiprobable, what is the rate of transmission of information? **[4]**

b) State Shannon's source coding Theorem. Apply Shannon-Fano coding for following message ensemble and find coding efficiency. **[6]**

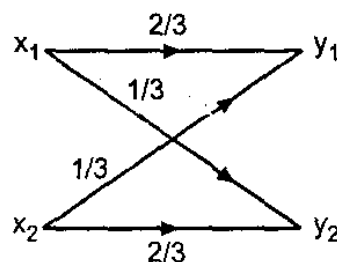
$$[X] = [x_1 \quad x_2 \quad x_3 \quad x_4]$$

$$[p] = [0.4 \quad 0.3 \quad 0.2 \quad 0.1]$$

OR

Q2) a) What is run Length Encoding? Explain with suitable example and application. **[4]**

b) A discrete source transmits messages x_1 and x_2 with probabilities $\frac{3}{4}$ and $\frac{1}{4}$. The source connected to the channel given below. Calculate $H(X)$, $H(Y)$ and $H(X,Y)$. **[6]**



P.T.O.

- Q3)** a) If a channel is band limited to 5 kHz and signal-to-noise ratio is 15, find the capacity of channel. [4]
b) Find all code words for the linear block code with following generator matrix $G = [1\ 0\ 1\ 0; 1\ 1\ 0\ 1]$ What is error detection and correction capability of the code? [4]
c) What is hamming code? Explain in brief. [2]

OR

- Q4)** a) State Shannon's information capacity theorem. What is its significance? [4]
b) What is perfect code explain with suitable example. [4]
c) What is hamming distance? Explain in brief. [2]

- Q5)** a) What is Finite Field? State any 4 properties of finite field. [6]
b) Write the method for generating systematic cyclic code. [4]

OR

- Q6)** a) Find any one minimal polynomial of $GF(2^3)$ whose Transfield is $GF(2)$ with primitive polynomial $x^3 + x + 1$. [6]
b) Draw the syndrome generator circuit for a (n,k) cyclic code. [4]

x x x