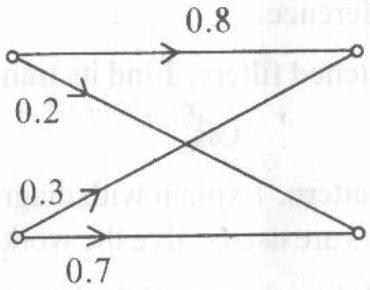
OR

10. a) Define the following terms :
    i) Information
    ii) Entropy
    iii) Channel capacity
    iv) Rate of Information
    v) Coding efficiency.

b) Find the mutual information and channel capacity of the channel shown in figure below. Given $P(x_1) = 0.6$ and $P(x_2) = 0.4$

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*Total No. of Questions :10]* *[Total No. of Printed Pages :4*

**Roll No .....**

# EC - 503

## B.E. V Semester

Examination, December 2013

## Digital Communication

***Time : Three Hours***

***Maximum Marks : 70***

***Note:*** Attempt any one question from each unit. All questions carry equal marks.

### Unit - I

1. a) Define and explain the following:
    i) Cumulative distribution function
    ii) Probability density function
    iii) Correlation and Auto correlation

b) A random variable has an exponential PDF given by $f(x) = ae^{-b|x|}$, where a and b are constants find (a) the relationship between a and b and (b) the distribution function of $x$.

OR

2. a) Define and explain Mean, variance and standard deviation of random variable. What is the need of the property "Standard deviation" after defining the property "Variance"?

b) The joint density function of two continuous random variables X and Y is given by

$$f(x,y)=\begin{cases}2 \text{ for } 0<x<1, 0<y<x\\ 0, \quad \text{otherwise}\end{cases}$$

Find :

i) The marginal density functions and

ii) The conditional density function.

## Unit - II

3. a) State and prove sampling theorem. Explain flat top and natural sampling why flat top sampling preferred over natural sampling?

b) What are the various process involved in PCM? With the help of block diagram explain the working of PCM transmitter and receiver.

OR

4. a) Explain how PPM and PWM signals are generated

i) From PAM signals

ii) Directly

How are these detected.

b) Describe delta modulation method. What are its limitations? How can they be overcome?

## Unit - III

5. a) Explain frequency shift keying. Describe coherent detection of BFSK signal. What should be the relationship between bit-rate and frequency shift for a better performance.

b) Explain the principle of QPSK. Differentiate between offset QPSK and non offset QPSK.







OR

6. a) Explain generation and reception of BPSK system compare it with BFSK system.

b) Explain

i) What is ON-OFF keying

ii) ASK is simplest among the keying system, still it is rarely used. Why.

iii) Why is BFSK signal not detected using filters.

## Unit - IV

7. a) Explain how pulse shaping reduce inter channel and inter symbol interference.

b) What are Matched filters. Find its transfer function.

OR

8. a) What is eye pattern. Explain with diagram. Also explain why equalizers are used. Give the working of equalizers.

b) Define probability of error. Calculate probability of error for BFSK.

## Unit - V

9. a) What is entropy. Show that the entropy is maximum when all symbols are equiprobable. Assume M = 3.

b) Apply Shannon-Fano coding procedure to find coding efficiency for the following message ensemble. [Take M=2]

$[X] = [x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7]$

[P] = [0.4 0.2 0.12 0.08 0.08 0.08 .04]