1019

B.E. (Electronics and Communication Engineering)
Fourth Semester
EC-403: Communication Theory

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

   a) Explain two main differences between analog & digital communication.

   b) Explain why 'noise figure (F)' cannot be less than '1'.

   c) Give any two applications where Hilbert's transform plays an important role in system designing.

   d) Define coding efficiency. Write what .are the various parameters on which it depends?

   e) Write any four differences between the application area of fixed length and variable length codes? (5x2)

UNIT – I

II. a) Sketch the block diagram of a general communication system and explain the working of each element of communication system. \

   b) Explain stationary processes with the help of an example. (5,5)

III. a) Find the output of a Hilbert transform filter if the input is $x(t) = \cos 2\pi f_0 t$.

   b) Compare the properties of various standard distributions (Binomial, Poisson, Uniform, Gaussian and Rayleigh). (4,6)

IV. a) A random signal variable has an exponential PDF given by $f(x) = ae^{-b|x|}$ where a and b are constants. Find

     (i)   The relationship between a and b
     ii) The distribution function of x

   b) Explain in short the properties of low pass and band pass filters. (7,3)

P.T.O.

UNIT – II

V. a) Define noise. Explain the classification and characterization of noise signal in detail.

   b) Define entropy. What is the significance of entropy in the designing of a communication system.

   (7,3)

VI. a) State & explain Shanon's channel capacity theorem. Derive the mathematical expression for capacity of a Gaussian channel. Also explain what is the tradeoff involved in bandwidth & SNR.

   b) A communication system has S/N = 20 and bandwidth =10 KHz. Find the allowable percentage reduction in signal power if bandwidth is increased to 40 KHz.

   (7,3)

VII. a) Write a comparison between lossless and lossy coding techniques.

   b) Explain the following terms:

   (i) Noise temperature

   (ii) Noise figure

   c) Prove that $H(X,Y) = H(X/Y) + H(Y)$.

   (3,3,4)

x-x-x