YMCA UNIVERSITYOF SCIENCE AND TECHNOLOGY , FARIDABAD
B.TECH. EXAMINATION (Under CBS)
Communication Engg.(ECE-301)

Time : 3 Hrs.

M.Marks: 60

Note: All questions are compulsory from part 1. Attempt any 4 questions from part 2.

Part-1

Q.No. 1 (A) The PSD & power of signal g(t) are respectively $S_g(\omega)$ & P_g. What would be PSD & power of signal ag(t).

(B) Why Gaussian distribution is most widely used.

(C) Prove that autocorrelation function at origin is equal to average power of signal

(D) What is coding efficiency and when it is maximum.

(E) State Krafts inequality.

(F) Determine the CDF of Rayleigh distribution.

(G).Differentiate between ensemble average & time average.

(H) For a Binary Symmetric channel probability of transmitting 1 & receiving 0 is β . What will be maximum value of β & why .

(I) Why symbol with least amount of probability of occurance, is encoded with largest amount of binary digits.

(J) Differentiate between energy and power signal.

2*10=20

Part-2

Q. No.2 (A) Derive an expression for energy spectral density function & also state its properties.   5

(B) Find the fourier transform of a periodic train of triangular pulse with period T & Base width of 2ζ & amplitude A.   5

Q.No 3 (A) What are continuous channel. Discuss various entropy relationships in continuous channels & also prove that $I(x)\geq0$ for continuous channel.   5

(B) Calculate mutual information and channel capacity for the following channel   5
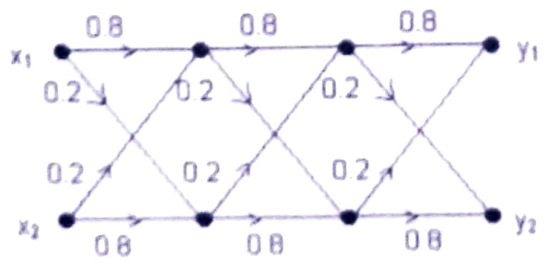
Q.No. 4 (A) State & prove Shannon Hartley theorem for capacity for continuous channel. 5

(B) For a cumulative distribution function ,prove that if $x_1 \leq x_2$,then

$$F_X(x_1) \le F_X(x_2)$$

Q.No. 5 (A) A joint density function of two random variables is

$$f_{XY}(x,y) . = Cxy \qquad 0 < x < 2 , 1 < y < 3$$
$$\phantom{f_{XY}(x,y) . =} 0 \qquad \text{otherwise}$$

5

1) Find value of C ,

5

2) Find $P(0 < X < 1 , 1 < Y < 2)$
3) Marginal distribution function of X & Y.
4) Find $P(X < 1, 2 < Y)$
5) Joint distribution function of X&Y
6) Find $P[(X+Y) < 3]$

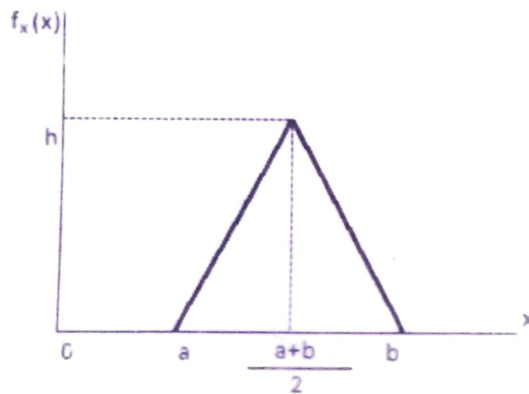(B) If X & Y are independent random variable then prove that

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$$Var(X+Y) = Var(X) + Var(Y)$$

Q.No. 6(A) A random variable has density function shown below. Find the corresponding
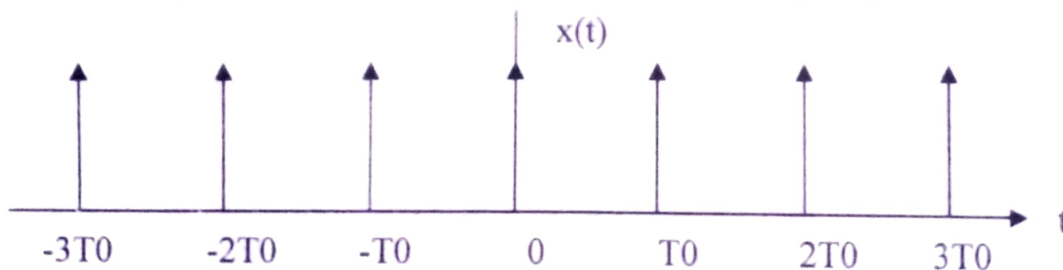entropy

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(B) Prove that power spectral density of a random process is a real function of
frequency

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Q.No. 7 (A) Find Exponential Fourier series for the following impulse train

5

(B) What is significance of optimum filter ? Calculate probability of error for
optimum filter

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