R18

Code No: 153BQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2021

PROBABILITY THEORY AND STOCHASTIC PROCESSES

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions

All questions carry equal marks

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1.a) State and prove Addition law of Probability.

b) A fair coin is tossed 3 times. Let X be a random variable that denotes the number of heads appearing in each outcome. Find and plot the CDF of X. [6+9]

2.a) Consider the experiment of tossing two dice simultaneously. If a random variable is defined as X=sum of the two faces, find and plot the pdf of X.

b) A binary communication system transmits two messages X=+1 and X=-1, with equal probability. At the receiver the messages received can be Y= +1 or 0 or -1. Let P(Y= -1/X= +1)=0.1; P(Y=+1/X=-1)= 0.2; P(Y=0/X= +1)=P(Y= 0/X= -1)=0.05. Find the probability P(X=0/Y=0). [7+8]

3.a) Verify that Rayleigh Density is a valid density Function.

b) Find and plot the CDF of uniform random variable distributed over (a, b). [7+8]

4.a) Find the density of the random variable Y=2X+3, where X is a uniform random Variable over (-2, 3).

b) A fair coin is tossed 10 times. Find the probability of getting the chance of Head 6 times? [8+7]

5. Find the density of the random variable Z=X+Y, where X and Y are two independent uniform random variables over (-1, 1). [15]

6. X and Y are two random variables defined as X=Cosφ and Y=Sinφ where 'φ' is a uniform random variable over (0,2π). a) Verify that X and Y are uncorrelated b) Check X and Y for independence. [7+8]

7.a) X(t)=A.Coswt is a random process, where 'A' is uniform random variable over (0, π). Check X(t) for stationarity.

b) X(t)=2.Cos(2πt+Y) is a 'Y' is a discrete random variable taking values '0', and 'π/2' with equal probability. Find the Mean of X(t) and $R_{XX}(0,1)$. [7+8]

8. X(t) = A. Cos(wt +φ) is a random process where 'φ' is uniform random variable over (-π,π) and 'A' is a normal random variable with zero mean and unity variance and is independent of 'φ'. Find the Autocorrelation function of X(t). [15]

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