Course Code: 1930414 Roll No: MLRS- R19

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Regular End Examination, March 2021

PROBABILITY THEORY AND STOCHASTIC PROCESSES

(ECE)

Time: 3 Hours. Max. Marks: 70

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	Obtain the expression for conditional density function and write its properties.	7M	CO	BL
	b)	A company sells high fidelity amplifiers capable of generating 10W, 25W and 50W of audio power. It has on hand 100 of the 10W units, of which 15% are defective, 70 of the 25W units with 10% defective, and 30 of the 50W units with 10% defective. i) What is the probability that an amplifier unit sold from the 10W units is defective? ii) If each wattage amplifier sells with equal likelihood, what is the probability of a randomly selected unit being 50W and defective?	7M	CO	BL
2	a)	A game of dice can be won outright if the sum of the two numbers showing up is either 7 or 11when two dice are thrown. Represent the sample space and find the probability of winning outright.	7M	CO	BL
	b)	Define CDF and write the properties of CDF of a random variable X.	7M	CO	BL
3	a)	Find the mean of a random variable with Poisson distribution.	7M	CO	BL
	b)	Define characteristic function of a random variable and show how moments can be generating using it.	7M	CO	BL
4	a)	Classify random processes and explain.	7M	CO	BL
	b)	Assume an ergodic random process X(t) has an autocorrelation function $R_{XX}(\tau)=18+\frac{2}{6+\tau^2}[1+4\cos(12\tau)]$ Find mean of X(t) and average power in X(t)	7M	CO	BL

Key prepared by
Dr. Srinivas Bachu
12/3/21

5	a)	The random variables Y_1, Y_2, X_1, X_2 are related by the relations shown below: $Y_1 = aX_1 + bX_2$, $Y_2 = cX_1 + dX_2$. Find $f_{Y_1Y_2}(y_1, y_2)$ in terms of joint density of X_1 and X_2.	7M	CO	BL
	b)	Explain the terms first order stationary process, WSS process and Strict sense stationary process with relevant expressions.	7M	CO	BL
6	a)	Derive the expression for cross power density spectrum of random processes X(t) and Y(t).	10M	CO	BL
	b)	Write the properties of power spectral density.	4M	CO	BL
7	a)	If X(t) is a stationary process , find the power spectrum of Y(t)= A+BX(t) in terms of power spectrum of X(t). Given A and B are constants.	7M	CO	BL
	b)	A source emits different symbols a, b, c, d, e with respective probabilities 0.1, 0.2, 0.1, 0.1, 0.5. Obtain the code words using Huffman coding and also calculate entropy.	7M	CO	BL
8	a)	State Shannon-Hartley law and explain its significance. Also derive Shannon's limit.	7M	CO	BL
	b)	Classify noise sources and write notes on thermal noise	7M	CO	BL

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