Code No: R20A0408

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2023

Probability & Random Processes

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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			Marks
		SECTION-I	
1	***A***	Explain about various types of sets and operations on sets in detail	**[7M]**
	B	An ordinary 52-card deck is thoroughly shuffled and 4 cards are drawn then what is the probability that all 4 cards are sevens?	**[7M]**
		OR	
2	***A***	Explain various types of events with necessary examples.	**[7M]**
	B	A machine gun fires 3 sec at the rate of 2400 bullets/minute. The probability of hitting the target is 0.4. Estimate the probability of exactly 50 bullets hitting the target.	**[7M]**
		SECTION-II	
3	***A***	Explain the operations expected value and variance of single random variable in detail.	**[7M]**
	B	The mean & variance of Binomial Distribution are 6 & 2.4 respectively. Find p{X>2}	**[7M]**
		OR	
4	***A***	Describe with necessary expression about the properties of probability density function.	**[7M]**
	B	Find the probability that if tossing a fair coin 5 times then there will be appear a) 3 heads b) 3 tails and 2 heads c) at least 1 head d) not more than one tail	**[7M]**
		SECTION-III	
5	***A***	Define and state the properties of joint density function and joint Distribution function	**[7M]**
	B	Explain statistical independence of the random variables.	**[7M]**
		OR	
6	***A***	The joint density function of random variables X and Y is $F_{x,y(x,y)=}4xye^{-(x^2+y^2)}u(x)u(y)$ f(y/x) and f(x/y))	**[7M]**
	B	The joint probability density function is $f_{x,y}(x,y) = 1/24 \quad 0 < x < 6, 0 < y < 4$ $= 0$ elsewhere Find the expected value of the function $g(X,Y)= (XY)^2$	**[7M]**
		SECTION-IV	
7	***A***	Differentiate random variable and random process.	**[7M]**

	B	A random process Y(t) is given as Y(t)=X(t)cos(ωt+Θ), where X(t) is a wide sense stationary random process , ω is constant and Θ is random variable independent on X(t),uniformly distributed on (-π,π). Find a) E[Y(t)] b) $R_{YY}(\tau)$.	**[7M]**

OR

8	***A***	Define LTI system and derive the expression for following for the response of LTI system. a) Mean b b) Auto correlation function c) Cross correlation	**[7M]**
	B	State and prove the properties of auto correlation function.	**[7M]**

SECTION-V

9	***A***	Define power spectral density and state and prove its properties.	**[7M]**
	B	A random process Y(t) has the power spectral density $S_{YY}(\omega)= 9/\omega^2+64$ Find the Auto correlation function of Y(t).	**[7M]**

OR

10	***A***	Derive the cross PSD between input and output of an LTI system	**[7M]**
	B	Find the PSD of WSS random process X(t) whose auto correlation function is $R_{XX}(r) = ae^{-b\|c\|}$	**[7M]**

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