Question Paper Code: R15A21EC03

R15

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, June/July – 2024

PROBABILITY THEORY AND STOCHASTIC PROCESS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	List the Axioms of Probability.	CO1	L1	2M
2.	A box contains nine cards numbered through 1 to 9, and B contains five cards numbered through 1 to 5. If a box is chosen at random, and a card is drawn which even numbered, what is the probability for the card to be from box A.	CO1	L2	3M
3.	Write the conditions for a function to be a random variable.	CO2	L1	2M
4.	Define central moment, variance and skew.	CO2	L1	3M
5.	Write two properties of joint distribution function of random variables.	CO3	L1	2M
6.	State Central Limit Theorem.	CO3	L1	3M
7.	Define autocorrelation function of a random process.	CO4	L1	2M
8.	What is a WSS random process.	CO4	L1	3M
9.	What is the expression for power spectral density.	CO5	L1	2M
10.	State wiener-Khinchin relation.	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	**i)** Define probability, set and sample spaces and random variables.	CO1	L2	5M
	ii) State and prove the total probability theorem?			5M
	OR			
B)	**i)** Find the probability of the card being either red or a king when one card is drawn from a regular deck of 52 cards	CO1	L2	5M
	ii) Given P(A) =1/3, P(B) =1/2, P(A∩B) = 1/5, then find P(AUB),P(A/B),P(B/A)			5M
12. A)	A random variable X has probability density function $f_X(x) = 5e^{-5x}$ $0 \le x \le \infty$ = 0 else where Find *i)* $E(X)$ *ii)* $E[(X-1)^2]$.	CO2	L2	10M
	OR			
B)	**i)** Define probality density function and prove its properties	CO2	L2	5M
	ii) Find mean and variance of uniform distribution function			5M
13. A)	**i)** State and prove the properties of joint characteristic function.	CO3	L2	5M
	ii) The joint density function of random variables X and Y is . $f_{XY}(x,y) = 8xy \quad 0 < x < 1, \quad 0 < y < x$ Find the conditional density functions f(x/y) and f(y/x).			5M
	OR			
B)	State and prove any four properties of joint characteristic function.	CO3	L2	10M

14. A)	Define autocorrelation function of a random process. Write properties of auto correlation function of a WSS process and prove any three of them.	CO4	L2	10M
	OR			
B)	A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not.	CO4	L3	10M
15. A)	Define cross power density spectrum and state and prove its properties	CO5	L2	10M
	OR			
B)	Develop the relationship between cross-power spectrum and cross-correlation function.	CO5	L3	10M