

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, Jan/Feb-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. Define probability, set and sample spaces.	CO1	L1	2M
2. Write the axioms of probability.	CO1	L1	3M
3. Explain about random variable and give example.	CO2	L2	2M
4. What is Variance and Skew.	CO2	L1	3M
5. Explain Joint Distribution and list the Properties.	CO3	L2	2M
6. State central limit theorem for the case of equal distributions.	CO3	L2	3M
7. Define Gaussian random process.	CO4	L1	2M
8. Explain about mean-ergodic process.	CO4	L2	3M
9. Define Autocorrelation Function and power spectral density.	CO5	L2	2M
10. Write any three properties of cross-power density spectrum.	CO5	L1	3M

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

11. A) State and prove Bayes Theorem.	CO1	L2	10M
OR			
B) Discuss about joint and conditional probabilities in detail.	CO1	L3	10M
12. A) Describe the binomial density and distribution function for case N=6 and p=0.25.	CO2	L2	10M
OR			
B) The density function of a random variable X is	CO2	L3	10M
$f_X(x) = \begin{cases} 5e^{-5x}, & 0 \leq x < \infty \\ 0 & \text{elsewhere} \end{cases}$			
Find: (i) E[X]. (ii) E [(X-1) ²].			
13. A) Differentiate between the marginal distribution functions, conditional distribution functions and densities.	CO3	L3	10M
OR			
B) Discuss about Function of joint random variables , Joint Moments about Origin and Joint central moments.	CO3	L2	10M
14. A) Classify random processes and A random process X(t) = A cos(ωot) + B sin(ωot) where ωo is a constant and A, B are uncorrelated zero mean random variables with same variances. Check whether X(t) is WSS or not?	CO4	L2	10M

OR

- B) Explain the concept of time average and ergodicity. Write the conditions for a random process to be ergodic in mean and autocorrelation. CO4 L2 10M
15. A) Derive the relation between cross power density spectrum and cross correlation function of a random process. CO5 L3 10M
- OR**
- B) Discuss Power Spectrum with its Properties and derive Relationship between Power Spectrum and Autocorrelation Function, CO5 L3 10M