Question Paper Code: R22A21HS01

R22

ANURAG Engineering College

(An Autonomous Institution)

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

PROBABILITY AND STATISTICS

(COMMON TO CIV, IT, CSE & AIML)

Time: 3 Hours **Max. Marks: 60**

Section – A (Short Answer type questions) (10 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	State Additional Probability Theorem	CO1	L1	1M
2.	If two dice are rolled at a time then what is the probability of getting the sum is 10?	CO1	L2	1M
3.	What is the variance of Poisson distribution?	CO2	L1	1M
4.	State Chebyshev's theorem	CO2	L1	1M
5.	Write any two properties of normal curve?	CO3	L1	1M
6.	Draw all the samples of size 2 from {1,2,3,4} without replacement	CO3	L2	1M
7.	Write the Z - test formula for single proportion	CO4	L1	1M
8.	What is the standard error of point estimate?	CO4	L1	1M
9.	Define transition probability matrix	CO5	L1	1M
10.	Define Markov chain	CO5	L1	1M

Section B (Essay Questions)

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

11. A)	In a certain assembly plant, three machines B_1, B_2, B_3, make 45%, 15% and 30% respectively, of the products. It is know that 3%, 1% and 2% of the products made by each machine, respectively, are defective. Now suppose that a finished product is randomly selected. a) What is the probability that it is defective? B) If the product selected is found to be defective what the probability that it was made by machine is B_1.	CO1	L3	10M
	OR			
B)	A continuous random variable X that can assume values between x=2 and x=5 has a density function given by $f(x)=\frac{2(1+x)}{27}$. Find i) Find the cumulative distribution function ii) P(X<4) iii) P(3≤X≤4).	CO1	L3	10M
12. A)	According to a study published by a group of University of Massachusetts sociologists, approximately 60% of the Valium users in the state of Massachusetts first took Valium for psychological problems. Find the probability that among the next 8 users interviewed from this state , i) None took Valium first for psychological problems ii) exactly 3 began taking Valium for psychological problems	CO2	L3	10M
	OR			

B)	If a bank received on the average 6 bad checks per day, what are the probabilities that it will receive i) 4 bad checks on any given day? ii) 10 bad checks over any 2 consecutive days iii) No bad check on any given day iv) What are the mean and variance of the number of bad check per day?	CO2	L3	10M
13. A)	In a distribution exactly normal, 7% of the items are under 35 and 39% are under 63.what are the mean and S.D. of the distribution?	CO3	L3	10M
	OR			
B)	A population consists of five numbers 3,4,6,8,9. Consider all possible samples of size 2 that can be taken without replacement from this population find (i)mean of the sampling distributions means(ii)standard deviation of sampling distributions means	CO3	L3	10M
14. A)	The mean breaking strength of cables supplied by a manufacturer is 1800 with a standard deviation of 100. By a new technique in manufacturing process it is claimed that the breaking strength of cables has increased. In order to test this claim a random sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support the claim at 0.01 level of significance.	CO4	L3	10M
	OR			
B)	In a city A, 25% of a random sample of 900 school boys had a certain slight physical defect. In another group B, 20% of random sample of 1600 school boys had the same defect. Is the difference between the proportions significant at 0.05 level of significance.	CO4	L3	10M
15. A)	The transition probability matrix of a Markov chain $\{X_n, n=1,2,\ldots\}$ having three states 1, 2 and 3 is $P=\begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$ and the initial distribution is $\prod_0 = (0.7, 0.2, 0.1)$. Find (i) $\Pr\{X_2 = 3\}$ (ii) $\Pr\{X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2\}$.	CO5	L3	10M
	OR			
B)	Suppose that a fair die is tossed. Let the states of X_n be k = (1, 2, 3, 4, 5, 6), where k is the maximum number shown in the first n tosses. Find p, p^2, and p^n calculate $\Pr\{X_2=6\}$.	CO5	L3	10M