R22

Code No: R22A0027

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

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

Statistical Inference and Stochastic Process

(CSE-AIML, CSE-DS & B.Tech-AIML)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (10 Marks)

Write all answers of this PART at one place

1	A	Define a continuous random variable with an example	**[1M]**
	B	Define variance in terms of expectations	**[1M]**
	C	What is mean and standard deviation of poisson distribution.	**[1M]**
	D	Define normal distribution.	**[1M]**
	E	Define the term regression line	**[1M]**
	F	State any two properties of regression coefficients	**[1M]**
	G	What is null hypothesis?	**[1M]**
	H	State two applications of f -test	**[1M]**
	I	Define Markov processes ?	**[1M]**
	J	What are the properties of TPM	**[1M]**

PART-B (50 Marks)

SECTION-I

2 A random variable X has the following probability function. **[10M]**

X	0	1	2	3	4	5	6	7
P(X)	0	K	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (i) k (ii) $P(0 \leq x \leq 3)$ (iii) $P(x>3)$ (iv) mean (v) variance

OR

3	A	Explian the following terms (i) probability mass function (ii) probability density function (iii)	**[5M]**
	B	Suppose a continuous random variable X has the probability density function $f(x) = k(1-x^2)$ for $0 < x < 1$, and $= 0$ otherwise. Then Find (i) k (ii). Mean (iii). Variance	**[5M]**

SECTION-II

4	A	Obtain mean and variance of Binomial Distribution	**[5M]**
	B	Components are packed in boxes of 20. The probability of a component being defective is 0.1. What is the probability of a box containing 2 defective components?	**[5M]**

OR

5 In a normal distribution 31% of the items are under 45 and 8% are over 64. Determine the mean and the variance of the distribution. **[10M]**

SECTION-III

6 A Find the spearman rank correlation coefficient to the following data: **[5M]**

X:	11	12	43	84	15
Y:	8	15	30	60	12

B From the following data, compute the coefficient of correlation between X and Y. **[5M]**

	X Series	Y Series
No. of Items	15	15
Arithmetic Mean	25	18
Sum of squares of deviations from mean	136	138
Sum of products of deviations of X and Y from their means	: 122	

OR

7 Find the coefficient of correlation from the following data **[10M]**

X	28	41	40	38	35	33	40	32	36	33
Y	23	34	33	34	30	26	28	31	36	38

SECTION-IV

8 A Test the significance of the difference between the means of the samples from the following data at 5%level: **[5M]**

	Sample A	Sample B
Size of sample	100	150
Mean	50	51
Standard deviation	4	5

B 1000 articles from a factory A are examined and found to have 3% defectives. 1500 similar articles from second factory B are found to have only 2% defectives. Can it be reasonably concluded that the product of the first factory is inferior to the second at 1% level of significance? **[5M]**

OR

9 A A survey of 320 families with 5 children each, revealed the following distribution. Is the result consistent with the hypothesis that male and female births are equally probable at 0.01 significance level? **[5M]**

No. of Boys	5	4	3	2	1	0
No. of Girls	0	1	2	3	4	5
No. of families	14	56	110	88	40	12

B In one sample of 10 observations, the sum of the squares of the deviations of the sample values from the sample mean was 120 and in another sample of 12 observations it was 314. Test whether this difference is significant at 5% level of significance. **[5M]**

SECTION-V

10	A	What is a Markov chain? Define state space and parameter space of a Markov chain	**[5M]**
	B	(i)What is Absorbing state in MC (ii) Define Recurrent or persistent state of MC	**[5M]**
		OR	
11	A	Explain the terms by an example (a) Regular Stochastic Matrix (b)Irreducible MC	**[5M]**
	B	Assume that a certain market of soft drinks is being shared by 3 brands B1 B2 B3 as 20%, 50% and 30% respectively. Further a study of market behaviour reveals that the following pattern has almost stabilized overtime.30% customers of B1 moved to B2 and 10% moved B3, while remaining 60% stick to B1 itself. For brand B2, the shifts B1 & B3 is 20% & 40% respectively while remaining 40% stick on the same brand Similarly, For brand B3, it is found that 30% shifts B1 & B2 is 20% & 50% stick on the same brand. construct TPM	**[5M]**

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