

Code No: R22A0027

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2025**Statistical Inference and Stochastic Process**

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

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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.

PART-A (10 Marks)**(Write all answers of this part at one place)**

			BCLL	CO(s)	Marks
1	A	Define variance of a random variable.	L2	CO-I	[1M]
	B	Write the relations between first two moments about mean and moments about origin.	L2	CO-I	[1M]
	C	If a coin is tossed 6 times in succession, find the probability of getting at least one head.	L2	CO-II	[1M]
	D	Explain the area property of the normal curve.	L2	CO-II	[1M]
	E	Explain scatter diagram.	L2	CO-III	[1M]
	F	Write the properties of regression coefficients.	L2	CO-III	[1M]
	G	A population consists of six numbers 4, 8, 12, 16, 20, and 24, find the population mean.	L2	CO-IV	[1M]
	H	Define Type-I error and Type – II error.	L2	CO-IV	[1M]
	I	Explain Markov process.	L2	CO-V	[1M]
	J	Define Stochastic Matrix.	L2	CO-V	[1M]

PART-B (50 Marks)**SECTION-I**

- 2 A For the probability function $f(x) = k x^2 e^{-x}$ when $x \geq 0$ find k, mean, variance. L3 CO-I [5M]
- B Given that $f(x) = \frac{k}{2}x$ is a probability distribution for a random variable X that can take on the values $X = 0, 1, 2, 3$ and 4 i) find k ii) mean and variance of X. L3 CO-I [5M]

OR

- 3 A If $f(x) = 3x^2$, when $0 \leq x \leq 1$ be the probability density function of a continuous random variable X. Determine a and b such that $P(X \leq a) = P(X > a)$ and $P(X > b) = 0.5$. L3 CO-I [5M]
- B Calculate first four moments of the following distribution about the mean L3 CO-I [5M]

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	8	12	20	30	15	10	5

SECTION-II

- 4 A Find the probability of getting three and 6 heads inclusive in 10 tosses of a fair coin by using Binomial distribution. L3 CO-II [5M]
- B If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2,000 individuals more than two will get a bad reaction. L3 CO-II [5M]
- OR
- 5 A 20% of items produced from a factory are defective, find the probability that in sample of 5 chosen at random (i) none is defective (ii) one defective. L3 CO-II [5M]

- B In a normal distribution, 31% of the items are under 45 and 8% of items are over 64, find the mean and S.D. of the distribution. L3 CO-II [5M]
- SECTION-III**
- 6 A 10 observations on price x and supply y the following data was obtained $\sum x = 130, \sum y = 220, \sum x^2 = 2288, \sum y^2 = 5506$ and $\sum xy = 3467$ find the coefficient of correlation. L3 CO-III [5M]
- B For the following data, find the regression line y on x. L3 CO-III [5M]
- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| y | 2 | 4 | 7 | 6 | 5 | 6 | 5 |
- OR
- 7 A Find the co-efficient of correlation between x and y from the given data L3 CO-III [5M]
- | | | | | | |
|---|---|---|---|---|----|
| x | 2 | 4 | 6 | 8 | 10 |
| y | 5 | 7 | 9 | 8 | 11 |
- B Regression equations are $3x + 2y = 26, 6x + y = 31$, find mean values and correlation Coefficient between x and y. L3 CO-III [5M]
- SECTION-IV**
- 8 A A coin is tossed 960 times and head turns up 183 times. Is coin biased? L3 CO-IV [5M]
- B A random sample of size 25 from a normal population has the mean $\bar{x} = 47.5$ and the standard deviation $S = 8.4$. Does this information tend to support or refuse the claim that the mean of the population is $\mu = 42.5$? (Tabulated = 2.064). L3 CO-IV [5M]
- OR
- 9 A Find the size of the sample if the S.D. of the population is 9 and there should be 99% confidence that error of estimate will not exceed 3. L3 CO-IV [5M]
- B In sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens. L3 CO-IV [5M]
- SECTION-V**
- 10 A Draw the transition diagram for transition L3 CO-V [5M]
- Matrix $\begin{bmatrix} 0 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0 \\ 1 & 0 & 0 \end{bmatrix}$.
- B Check the following stochastic matrix is regular or L3 CO-V [5M]
- not $\begin{bmatrix} 0 & 1 & 0 \\ \frac{1}{5} & \frac{2}{5} & \frac{2}{5} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \end{bmatrix}$
- OR
- 11 A Check whether the Matrix is irreducible $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{2}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{2}{3} \end{bmatrix}$ L3 CO-V [5M]
- B Suppose $e_0 = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \end{bmatrix}$ is the initial state distribution for a Markov process with the transition matrix $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ 2 & 2 \\ 1 & 0 \end{bmatrix}$, find e_1, e_2, e_3 . L3 CO-V [5M]
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