

Code No: **R20A0024****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024**Probability and Statistics****(CSE, IT, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIDS & B.Tech-AIML)**

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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 A A random variable X has the following probability function: [7M]

X	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K

Then find (i) K (ii) Expectation (iii) The Variance

- B Suppose a continuous random variable X has the probability density function [7M]

$$f(x) = k(1-x^2) \text{ for } 0 < x < 1, \text{ and} \\ = 0 \text{ otherwise.}$$

Then Find (i) k (ii). Mean (iii). Variance

OR

- 2 The joint distribution of X and Y is given by [14M]

$f(x, y) = 4xye^{-(x^2+y^2)}, x \geq 0, y \geq 0$ Find the Marginal density function of X and Y. Also test whether X and Y are Independent.

SECTION-II

- 3 A If a Poisson distribution is such that $P(x=1) \cdot \frac{3}{2} = P(x=3)$. then find [7M]

I) $P(x \geq 1)$ ii) $P(x \leq 3)$ iii) $P(2 \leq x \leq 5)$

- B Write the Characteristics of Normal distributions [7M]

OR

- 4 In a normal distribution 31% of the items are under 45 and 8% are over 64. [14M]
Determine the mean and the variance of the distribution.

SECTION-III

- 5 A If $\sigma_x = \sigma_y = \sigma$ and the angle between two regression lines is [7M]
 $\tan^{-1}\left(\frac{4}{3}\right)$, Compute r

- B A random Sample of 5 college Students is selected and their grades in [7M]
Mathematics and Statistics are found to be

Mathematics	85	60	73	40	90
Mechanics	93	75	65	50	80

Calculate Spearman's rank correlation coefficient.

OR

- 6 Find the coefficient of correlation from the following data [14M]

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

SECTION-IV

- 7 **A** A random sample of size 100 is taken from a population with $\sigma = 5.1$, given that the sample mean is 21.6. Construct a 95% confidence interval for the population mean μ . **[7M]**
- B** A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there 150 students having mean IQ of 75 with a S. D of 15 in the second group there are 250 students having mean IQ of 70 with S. D of 20. Is there a significant difference between the means of two groups? (Use $\alpha=0.01$). **[7M]**

OR

- 8 A population consists of the five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find (i) The mean of the population. (ii) The standard deviation of the population. (iii) The mean of the sampling distribution of means (iv) The standard deviation of the sampling distribution of means. **[14M]**

SECTION-V

- 9 **A** A random sample of 10 boys had the following I. Q's.70,120,110,101,88,83,95,98,107, 100. Does this data support the assumption of a population mean I.Q of 100. **[7M]**
- B** Write the properties of F- distribution. **[7M]**

OR

- 10 In an investigation on the machine performance. the following results are obtained. **[14M]**

	No. of units inspected	No.of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$ level of significance.
