**24U295**

Name    : .....................................

Reg. No  : .....................................

## SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2025

### (FYUGP)

### CC24USTA2MN101 - PROBABILITY THEORY - I

(Statistics - Minor Course)

(2024 Admission - Regular)

Time: 2.0 Hours

Maximum: 70 Marks

Credit: 4

### Part A (Short answer questions)

Answer *all* questions. Each question carries 3 marks.

1. Describe moments. [Level:2] [CO1]

2. Describe variance of a discrete random variable and it's properties. [Level:2] [CO1]

3. Describe Binomial distribution. [Level:2] [CO1]

4. Explain probability mass function of a discrete random variable. [Level:2] [CO1]

5. Explain Rectangular distribution. [Level:2] [CO2]

6. Explain merits and demerits of Normal Distribution. [Level:2] [CO2]

7. Explain the application of correlation. [Level:2] [CO3]

8. Explain the properties of ' t ' distribution. [Level:2] [CO4]

9. Describe chi- square distribution. [Level:2] [CO4]

10. Discuss the difference between Parameter and Statistic. [Level:2] [CO4]

**(Ceiling: 24 Marks)**

### Part B (Paragraph questions/Problem)

Answer *all* questions. Each question carries 6 marks.

11. Calculate mean, and m.g.f of Poisson distribution. [Level:3] [CO1]

12. A random variable X has the following probability function  f(0)=1/6; f(1)=2/6; f(2)=3/6; and f(x)=0 otherwise. Write down the distribution function and find (i)P(X<2)  (ii) P(0<X<2) [Level:3] [CO1]

13. If the mean and variance of a Binomial distribution are 4 and 2 respectively. Find the probability of (i) exactly 3 successes(ii) less than 3 successes [Level:3] [CO1]

14. Explain Exponential distribution also find it's mean and variance. [Level:3] [CO2]

15. Compute rank correlation for the following data.The ranks given by two judges     [Level:3] [CO3]
to10 ladies in a beauty contest are as given below

| Judge 1 | 1 | 5 | 4 | 8 | 9 | 6 | 10 | 7 | 3 | 2 |
|---------|---|---|---|---|---|---|----|---|---|---|
| Judge 2 | 4 | 8 | 7 | 6 | 5 | 9 | 10 | 3 | 2 | 1 |

16. Compute Spearman's rank correlation for the following data.The marks of 10     [Level:3] [CO3]
students in two subjects Maths and Statistics are as follows

| Maths | 45 | 56 | 39 | 54 | 45 | 40 | 56 | 60 | 30 | 35 |
|-------|----|----|----|----|----|----|----|----|----|----|
| Statistics | 40 | 56 | 30 | 44 | 36 | 32 | 45 | 42 | 20 | 36 |

17. Calculate Karl Pearson correlation coefficient from the following data and interpret     [Level:3] [CO3]
the result

| x | 6 | 5 | 8 | 8 | 7 | 6 |
|---|---|---|---|----|---|---|
| y | 8 | 7 | 7 | 10 | 5 | 8 |

18. Compute the distribution of sample mean     [Level:3] [CO4]

**(Ceiling: 36 Marks)**

**Part C** (Essay questions)

Answer any *one* question. The question carries 10 marks.

19. The weekly wages of 1000 workmen are normally distributed with a mean of 72     [Level:3] [CO2]
and a standard deviation 5. Calculate the number of workers whose wages lie (i)
betweem 69 and 72. (ii) greater than 80.

20. Determine the two regression lines from the data given below.     [Level:3] [CO3]

| Sales | 91 | 97 | 108 | 121 | 67 | 124 | 51 | 73 | 111 | 57 |
|-------|----|----|-----|-----|----|-----|----|----|-----|----|
| Purchase | 71 | 75 | 69 | 97 | 70 | 91 | 39 | 61 | 80 | 47 |

Estimate the sales when purchase is 55 and also find purchase when sales is 85.

**(1 × 10 = 10 Marks)**

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