24U299 (Pages: 2) Name : .....

Reg. No : .....

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2025

(FYUGP)

CC24USTA2MN105 - INTRODUCTION TO PROBABILITY

(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. Explain Scatter diagram. [Level:2] [CO1]
2. Differentiate between positive and negative correlation with suitable examples. [Level:2] [CO1]
3. If $b_{yx} = 0.83$, $\sigma_x = 10$, $\sigma_y = 12$. Calculate "r". [Level:3] [CO2]
4. Explain why there are two regression lines in bivariate regression analysis. [Level:2] [CO2]
5. Define the following terms in probability: [Level:1] [CO3]
   (a) Random experiment (b) Sample space (c) Event
6. Define the Axiomatic approach to Probability. [Level:1] [CO3]
7. In a sample of 40 vehicles, 18 are red, 6 are trucks and 2 are both. Suppose that a randomly selected vehicle is red. What is the probability it is a truck? [Level:2] [CO3]
8. In a class of 30 students, 18 like Mathematics, 15 like Science, and 10 like both subjects. What is the probability that a randomly selected student likes Mathematics or Science? [Level:3] [CO3]
9. Is the PDF of a random variable always a positive function? Justify your answer. [Level:3] [CO4]
10. Distinguish between discrete and continuous random variable. [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

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

11. Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y). [Level:3] [CO1]

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

12. Demonstrate that the correlation coefficient always lies between -1 and 1. [Level:3] [CO1]

13. Calculate the most likely price in Bombay corresponding to price of 70 at Calcutta from the following data. [Level:3] [CO2]

	Bombay	Calcutta
Arithmetic Mean	67	65
Standard Deviation	3.5	2.5

Coefficient of corelation between the price of two cities is 0.8.

14. Out of the two lines of regression given by $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$. Calculate the mean values of X and Y and the coefficient of correlation. [Level:3] [CO2]

15. State independence of two events. Given that $P(A) = 0.4,\ P(B) = 0.5$ and events A and B are independent, compute $P(A \cap B)$ [Level:3] [CO3]

16. Define the mathematical definition of probability.Two unbiased dice are thrown. Write down the sample space and also calculate the probability of [Level:3] [CO3]

1. One die shows five
2. First die shows five.

17. Define distribution function.The cumulative distribution function (CDF) of a random variable Xis given by: [Level:3] [CO4]

$$F(x) = \begin{cases} 0 & \text{for } x < 0 \\ \frac{x}{2} & \text{for } 0 \le x \le 2 \\ 1 & \text{for } x > 2 \end{cases}$$

Find $P(0 \le x \le 1)$

18. Define probability mass function. Obtain the probability distribution of the number of 6's in two tosses of dice. [Level:3] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

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

19. Calculate the rank correlation coefficient of the folliowing data. [Level:3] [CO1]

Series A	115	109	112	87	98	120	98	100	98	118
Series B	75	73	85	70	76	82	65	73	68	80

20. A random variable Y has pmf $f(y) = ky,\ y = 1, 2, 3, 4$. Determine the value of k and then compute $P(Y \ge 2)$ and $P(Y \le 3)$. [Level:3] [CO2]

(1 × 10 = 10 Marks)

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