24U389 (Pages: 2) Name : .....

Reg. No : .....

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

CC24USTA3MN211 - PROBABILITY THEORY AND STATISTICAL DISTRIBUTIONS

(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 complementary and commutative law. [Level:2] [CO1]
2. Define probability distributions. [Level:2] [CO2]
3. Differentiate between discrete random variable with an example. [Level:2] [CO2]
4. Write down the properties of gamma distribution. [Level:2] [CO3]
5. What is a continuous Cauchy distribution. [Level:2] [CO3]
6. Describe the uniform distribution. [Level:2] [CO3]
7. Explain the properties of beta distribution. [Level:2] [CO3]
8. Write the R code to generate the pdf of a normal distribution with mean = 0 and standard deviation = 1, for x = -4 to 4. [Level:2] [CO4]
9. Write the R code for plotting the probability distribution of a Poisson distribution with $\lambda = 10$, for x = 0 to 20. [Level:2] [CO4]
10. Write the R code to plot the pdf of a uniform distribution in the interval (2, 6), taking a step size of 0.01 between values of x. [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

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

11. (i) Prove that $P(A') = 1 - P(A)$ [Level:2] [CO1]
    (ii) Prove that $P(\phi) = 0$

12. Define variance.Let a student scores marks (out of 5) with probabilities: [Level:3] [CO2]

X	0	1	2	3	4	5
P(X)	0.05	0.10	0.20	0.30	0.20	0.15

Find the variance of marks.

13. Describe mathematical expectation .Let a random variable X has the distribution: [Level:3] [CO2]

X	1	2	3	4
P(X)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

Find the E(X).

14. Describe the distribution function and write its any four properties. [Level:2] [CO2]

15. The number of car accidents on a highway during a month follows a Poisson distribution with mean 5. Find the probability that in a given month there are: [Level:3] [CO3]
(i) No accidents, (ii) At most 3 accidents, (iii) More than 5 accidents.

16. Define binomial distribution.Four coins are tossed simultaneously. What is the probability of getting 2 heads? [Level:3] [CO3]

17. Write about the exponential distribution and its properties. [Level:2] [CO3]

18. Define importance of cumulative distribution function and write the code for plotting cdf of poisson distribution $\lambda = 3$. [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

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

19. Describe subjective, classical, frequency and axiomatic definition of probability. [Level:2] [CO1]

20. Explain Normal distribution and derive its mean and variance. [Level:2] [CO3]

(1 × 10 = 10 Marks)

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