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D3BMC2305 **Reg. No.............................**

Name: ....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(Regular/Improvement/Supplementary)

COMPUTER SCIENCE & MATHEMATICS (DOUBLE MAIN)

GDMA3B04T: DISTRIBUTION THEORY AND STATISTICAL INFERENCE

Time: 2 Hours **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 marks)

1. Define a Bernoulli random variable. Find its mean and variance.
2. Derive the moment generating function of uniform distribution.
3. Explain the concept of conditional distribution.
4. Write a short note on bivariate expectations.
5. Define sampling distribution and standard error.
6. Distinguish between simple and composite hypothesis.
7. Define characteristic function and mention one of its uses.
8. Distinguish between discrete and continuous random variables with examples.
9. Define Probability Mass Function.
10. Derive the relation between raw and central moments.
11. What do you mean by p-value?
12. Define Pareto and Cauchy distribution.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)

13. Verify whether the following function is a density function or not:

    $f(x) = x(2-x), \;\; 0 < x < 2, and \;\; 0 \;\; elsewhere.$

14. Define the "distribution function" of a random variable and state its essential properties.
15. State and prove addition theorem of expectation.
16. Two cards are drawn at random from ten cards numbered 1 to 10. Find the expectation of the sum of points on two cards.
17. Define exponential distribution. Also state and prove its lack of memory property.

(PTO)

18. Briefly explain one-way ANOVA.
19. A certain stimulus administered to each of the 12 patients resulted in the following increase of blood pressure:

    5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4 and 6.

    Can it be concluded that the stimulus will, in general, be accompanied by an increase in blood pressure?

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. A player tosses 3 fair coins. He wins Rs.8, if three heads occur; Rs. 3, if 2 heads occur and Re. 1, if one head occurs. If the game is to be fair, how much should he lose, if no heads occur?
21. Derive Poisson distribution as a limiting case of Binomial distribution.

(1 × 10 = 10 Marks)