

**THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023**  
**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. Distinguish between discrete and continuous random variables with examples.
2. Derive the characteristic function of Binomial distribution.
3. What do you mean by marginal and conditional distributions?
4. Explain the types of errors occur in testing of statistical hypotheses.
5. Define moment generating function. What are the limitations of moment generating function?
6. Find the expectation of the number on a fair die when thrown.
7. Derive the recurrence formula for the probabilities of Poisson distribution.
8. Define Negative Binomial distribution.
9. State any four properties of distribution function.
10. Distinguish between statistic and parameter with examples.
11. Write down the moment measures of skewness and kurtosis.
12. Define (i) Level of significance (ii) p-value.

**SECTION B: Answer the following questions. Each carries *five* marks.**

**(Ceiling 30 Marks)**

13. The joint probability density function of a two dimensional random variable  $(X, Y)$  is given by

$$f(x, y) = \begin{cases} 2 & 0 < x < 1, 0 < y < x \\ 0 & \text{elsewhere} \end{cases}$$

Find the marginal density functions of  $X$  and  $Y$ .

14. Derive the relationship between raw and central moments.
15. Define Karl Pearson coefficient of correlation. Prove that it is independent of change of origin and scale.
16. Derive the mean, variance and moment generating function of discrete uniform distribution.
17. In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?
18. (i) Distinguish between point and interval estimation.  
(ii) Distinguish between simple and composite hypotheses.
19. Explain Chi-square test for independence.

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

20. Derive the recurrence relation for the moments of Binomial distribution.
21. Explain t-test for single mean. Nine determinations of copper in a certain solution yielded a sample mean of 8.3 percent with a standard deviation of 0.025 percent. Let  $\mu$  be the mean of the population of such determinations. Test  $H_0 : \mu = 8.42$  against  $H_1 : \mu < 8.42$  at level  $\alpha = 0.05$ .

**(1 x 10 = 10 Marks)**