FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(Regular/Improvement/Supplementary)

ECONOMICS & MATHEMATICS (DOUBLE MAIN)

GDMT5B08T: STATISTICAL INFERENCE

Time: 2 ½ Hours   Maximum Marks: 80

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 25 marks)

1. What are the properties of a good estimator?

2. Define likelihood ratio test.

3. Explain the chi square test for independence of attributes.

4. Write down the ANOVA table for one-way classification.

5. Explain Kruskal Wallis test.

6. Show that sample variance is not an unbiased estimator of the population variance for a normal population.

7. Explain the maximum likelihood method of estimation.

8. Write the 95% confidence interval for variance of a normal population.

9. Distinguish between parameter and statistic.

10. Define systematic sampling.

11. State Fisher –Neyman factorization theorem.

12. Define simple and composite hypothesis and give examples.

13. Explain the two kinds of errors that are likely in testing of hypothesis.

14. Explain the steps involved in the solution of a testing of hypothesis problem.

15. Describe sign test.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 35 marks)

16. What is a random sample? Describe two methods of simple random sampling.

17. Let $X_1, X_2, \dots, X_n$ be iid b(1,p) random variables. Then show that $T = \sum_{i=1}^{n} X_i$ is sufficient for p.

18. Estimate λ using method of moments for $f(x, \lambda, \alpha) = \frac{\alpha^\lambda}{\Gamma\lambda} x^{\lambda-1} e^{-\alpha x}$, where λ is unknown, $0 \le x < \infty$.

(PTO)

19. Let $X_1, X_2, \ldots, X_n$ be a random sample from U(0,θ) population. Obtain MVUE for θ.

20. In a sample of 600 men from city A, 450 are found to be smokers. Out of 900 from city B, 450 are smokers. Do the data indicate that the cities are significantly different with respect to prevalence of smoking

21. A sample of 12 observations gives a mean equal to 40 and standard deviation 4. Can we conclude that the population mean is 42?

22. Write a short note on Kolmogorov-Smirnov test and Wilcoxon signed rank test.

23. Two independent samples of 8 and 7 items respectively had the following values.

Sample I	9, 11, 13, 11, 15, 9, 12, 4
Sample II	10, 13, 11, 14, 9, 7, 10

Do the population variances differ significantly?

SECTION C: Answer any *two* questions. Each carries *ten* marks.

24. Explain the advantages of sampling over census. Explain stratified sampling and cluster sampling.

25. State and prove Cramer Rao inequality.

26. Explain small sample tests and large sample tests. Distinguish between their applicational roles with illustration.

27. Fit a Poisson distribution to the following data and test the goodness of fit.

x	0	1	2	3	4	5	6
f	275	75	32	8	7	2	1

(2 × 10 = 20 Marks)