M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
I Year II Semester
Mathematical Statistics

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define sample mean and sample variance.
2. Define Student's t variable.
3. State Lehmann-Scheffe theorem.
4. Define minimal sufficient statistic.
5. Define monotone likelihood ratio.
6. Define most powerful test.
7. Define F-Statistic.
8. Define generalized likelihood ratio.
9. When a random variable is said to be pivot?
10. Define lower and upper limits of the interval.
11. Define type - I and type – II errors.
12. Define Likelihood function.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. State and prove necessary condition for an estimator to be consistent.
14. State and prove Rao-Blackwell theorem.
15. Let T(x) be maximal invariant with respect to G. Then prove that $\emptyset$ is invariant under G if and only if $\emptyset$ is a function of T.
16. A die is rolled 120 times with the following results.

X	1	2	3	4	5	6
F	20	30	20	25	15	10

    Test the hypothesis that the die is fair at $\alpha = 0.05$.
17. Write a note on shortest length confidence interval.
18. Let $V \sim F(m,\ n)$, Find $E(X)$ and $Var(X)$.

19. State and prove Cramer-Rao inequality.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. State and prove Glivenko-Cantelli theorem.
21. State and prove Factorization criterion.
22. State and prove Neyman-Persaon Lemma.

23. Prove that the random variable $\sum_{i=1}^{k} \left[\dfrac{(X_i - n_i p_i)}{\sqrt{n_i p_i (1 - p_i)}} \right]^2$ converges in distribution to the $\chi^2(k)$ random variable as $n_1, n_2, \ldots \ldots n_k \to \infty$.

24. Explain two-way analysis of variance with one observation per cell.

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