M.Sc. DEGREE EXAMINATION,APRIL 2020
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 an estimator.
2. Define minimum variance unbiased estimator.
3. What is a likelihood function?
4. Define the method moments estimation.
5. Define level of significance.
6. What is a critical region?
7. Define likelihood ratio for testing $H_0 : \theta \in \theta_0$ against $H : \theta \notin \theta_0$.
8. Define likelihood ratio test.
9. State the total sum of square for one - way ANOVA.
10. State the linear regression model.
11. Define minimal sufficient statistic.
12. State the confidence interval for mean of the normal distribution.

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

Answer any **FIVE** questions

13. State and prove Rao - Blackwell theorem.
14. Let X be a Binomial random variable with parameters n and p. Estimate p by Maximum Likelihood Estimation (MLE) method.
15. Determine the most powerful (MP) critical region in random sampling from a Normal distribution when mean is unknown but variance known for testing $H_0 : \mu = \mu_0$ against $\mu = \mu_1$.
16. Let $X_1, X_2..X_n$ be a random sample from a normal distribution with unknown mean μ and known variance σ^2. Thus $\theta = \mu$ and the simple hypothesis $H_0 : \mu = \mu_0$. Construct the Likelihood ratio test for the alternative hypothesis $\mu \neq \mu_0$.
17. State the ANOVA table of two - way classification.
18. If X $\sim$ N ($\mu,\ \sigma^2$). Prove that $\overline{x} = \dfrac{\sum x}{n}$ is an unbiased estimator for μ.

19. Explain the procedure for finding confidence Interval.

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

Answer any **THREE** questions

20. State and prove the Chapman - Robbins inequality.

21. Let $X \sim N (\mu, \sigma^2)$, Estimate the confidence interval for the parameter μ.

22. State and prove the Neyman – Pearson lemma.

23. Nine adults agreed to test the efficacy of a view diet program. Their weights were measured before and after the program and found to be as follows:

	Participants								
	1	2	3	4	5	6	7	8	9
Before	132	139	126	114	122	132	142	119	126
After	124	141	118	116	114	132	145	123	121

Test the diet is not effective.

24. Explain the testing of hypothesis under linear regression model.