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 Point Estimation.
2. What is meant by mean square error?
3. State the different methods of estimation.
4. Define Minimum Chi – Square estimate.
5. Define Type I and Type II error.
6. What is the level of significance of the test?
7. Define likelihood ratio for testing $H : \in \Theta_0$ against $K : \in \Theta_1$.
8. State the asymptotic properties of the likelihood ratio test.
9. State the total sum of square for two – way ANOVA.
10. Define simple linear regression model
11. Define boundedly complete.
12. State the standard error of regression.

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

Answer any **FIVE** questions

13. Let X_1, $X_2$and X_3be three independent observations on a random variable X ˜B(1,Θ).Show that the statistic T = X_1+2X_2+3X_3 is not sufficient for Θ.
14. Let X be a Poisson random variable with parameter Θ. Estimate Θ by Maximum Likelihood Estimation (MLE) method.
15. Let X ˜ U(0, Θ) and two independent observations X and Y are randomly selected to test H: Θ = 1.0 against K: Θ = 2.0. Find the size and power of the test given by the test function

    $$\varphi(x, y) = \begin{cases} 1, & if\,(x+y) \geq 0.75 \\ 0, & otherwise \end{cases}$$

16. Likelihood ratio test for the Binomial random variable.
17. State the ANOVA table of one - way classification.

18. If X ˜ N (μ σ^2). Prove that $S^2 = \frac{\sum (X_i - \overline{X})^2}{n-1}$ is an unbiased estimator for σ^2.
19. State the properties of the least - square fit.

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

Answer any **THREE** questions

20. State and prove the Cramer – Rao inequality.
21. Let X ˜ N (μ σ^2), Estimate the 100(1 - α)% confidence interval for the parameter μ
22. State and prove the Neyman – Pearson lemma.
23. Perform the likelihood ratio test for the mean of a Normal population.
24. Explain the testing significance and analysis of variance of regression.

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