K24N 0166

Reg. No. : ....

Name : ....

Second Semester M.Sc. Degree (CBSS – Reg./Supple./Imp.) Examination, April 2024
(2022 Admission Onwards)
STATISTICS WITH DATA ANALYTICS
MST2C06 : Statistical Inference

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions. **Each** carries 2 marks.

1. Define ancillary statistic with an example.
2. Give two applications of Rao-Blackwell theorem.
3. Discuss the relation between size of the confidence interval and sample size.
4. Is estimates given by method of moments are consistent ? Substantiate.
5. Define the following : (i) size of a test (ii) power function.
6. Describe GLRT.
7. What is meant by sign test ?
8. Distinguish between parametric and non-parametric tests. **(8×2=16)**

PART – B

Answer **any four** questions. **Each** carries **4** marks.

9. Discuss complete sufficient statistic with examples.
10. State and prove Basu's theorem.

P.T.O.

11. A sample of size one is taken from Bernoulli distribution with parameter $p \in \left[\frac{1}{4}, \frac{3}{4}\right]$. Obtain the MLE of p.

12. Describe the following : (i) LMP tests (ii) α similar test.

13. Obtain the UMP test for testing $H_0 : \theta \leq \theta_0$ against $H_1 : \theta > \theta_0$ based on a sample of n observations from $U(0, \theta)$, $\theta > 0$.

14. Describe one sample KS test. **(4×4=16)**

PART – C

Answer **any four** questions. **Each** carries **12** marks.

15. State and prove Lehmann-Scheffe theorem. Obtain UMVUE for $e^{-\theta}$ based on a random sample from Poisson distribution.

16. Write short notes on the following with examples :
(i) joint sufficient statistic (ii) BLUE (iii) CAN estimators.

17. Describe the procedure of MLE. Give an example to illustrate that MLE is not unique. Also state any two properties of MLE.

18. State and prove Cramer-Huzurbazar theorem. State the relation between confidence interval and hypothesis testing.

19. State Neyman-Pearson lemma. Obtain the most powerful size α test using a single observation on $X \sim f(x)$ given that $H_0 : f(x) = \begin{cases} 4x, & 0 < x < \frac{1}{2} \\ 4 - 4x, & \frac{1}{2} \leq x < 1 \end{cases}$ against $H_1 : f(x) = 1,\ 0 < x < 1$.

20. Discuss Wald-Wolfowitz run test. Derive the mean and variance of total number of runs. **(4×12=48)**