SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. END SEMESTER EXAMINATIONS NOVEMBER - 2022
SEMESTER - II
20PBSCT1002 - Statistical Inference - I

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. State and prove Chapman-Robbins inequality.
2. Prove that the variance of an UMVUE need not be equal to C-R lower bound.
3. State and prove Neyman-Fisher factorization theorem for determining sufficient statistics.
4. If X_1, X_2, ...,X_n are iid B (1, p) random variables, then verify whether or not the statistic $T = \sum_{i=l}^{n} x_i$ is complete sufficient.
5. Write a note on assumptions and properties of MLE.
6. Prove that for large samples,the estimators obtained by the methods of maximum likelihood and minimum chi-square are same.
7. Determine 100(1 - α)% shortest length confidence interval for mean using sufficient statistic,based on a random sample of size 'n' from normal population with known variance.
8. Let X follow binomial distribution B (n, p) and let a priori distribution of 'p' be n(p) = 1 for $0 < p < 1$. Find the Baye's estimate of 'p', when the loss function is square error.

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. State and establish Rao-Blackwell theorem. Describe Rao-Blackwellisation technique for obtaining UMVUE.
10. Explain ML estimation based on grouped, truncated, and censored data.
11. State detailed note on the construction of confidence interval for reliability of a one parameter family of distributions.

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12. Let X follow normal distribution N (μ, 1), $\mu \in \mathcal{R}$ and a priori distribution of 'μ' be N (0, 1). Obtain the Bayes estimator of 'μ', when the loss function is squared error.

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. State and prove the uniqueness of MVUE.

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