Roll.No. 25PBSCT1002

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.Biostatistics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - I
25PBSCT1002 - Statistical Inference I

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

Section B

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

1. Consider the problem of estimating the parameter θ using a random sample of n independent observations from $B(1, \theta)$. Find MVB for the variance of the estimator.
2. If $X_1, X_2, ...X_n$ is a random sample from $N(\mu, \sigma^2)$, where σ^2 is known then show that the sample mean is sufficient for μ.
3. State the properties of maximum likelihood estimators.
4. Explain the general method of construction confidence intervals.
5. Explain prior and posterior distribution.
6. Explain the method of minimum chi-square.
7. State and prove Rao-Blackwell theorem.
8. Determine the shortest average width CI for the mean of exponential distribution with mean θ, using a random sample of n observations

Section C

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

9. State and prove Lehmann-Scheffe theorem.
10. Obtain the moment estimators for α and θ of gamma distribution $G(\alpha, \theta)$ whose pdf is $f(x, \theta) = \frac{\alpha^\theta}{\Gamma(\theta)} e^{-\theta x} x^{\theta - 1}, x > 0; \theta > 0; \alpha > 0.$
11. If T_n is a consistent estimator of a parameter θ and g is a continuous function then prove that $g(T_n)$) is a consistent estimator of $g(\theta)$.
12. Using a random sample of size n from Poisson distribution with parameter θ, determine a large sample CI for θ.

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

13. Given a random sample of n observations on X with $X \sim G(\theta, p)$, where p is known. Find the posterior distribution of θ and the Bayes estimator of θ if the prior distribution of α is $G(\theta, \delta)$.

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