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Total Pages : 4

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STATISTICAL INFERENCE–I

Paper–234

Semester–III

Time Allowed : 3 Hours]   [Maximum Marks : 30

Note : The candidates are required to attempt **two** questions each from Sections A and B carrying 4 marks each and the entire Section C consisting of 7 short answer type questions carrying 2 marks each.

SECTION—A

1. State and prove Factorization theorem.   4

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2. State and prove Rao Blackwell theorem.   4

3. Define consistency of an Estimator. If T is a consistent estimator of θ, show that T^2 is also consistent for θ^2.   4

4. Obtain $100(1-\alpha)\%$ Confidence Interval for the variance of Normal Distribution.   4

SECTION—B

5. Define the following :   4

    (i)   Simple and composite hypothesis.

    (ii) Size of the critical region and power of test.

    (iii) UMP and UMPU test.

6. Explain method of MLE and mention its properties.   4

7. Use NP Lemma to obtain MPCR for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta > \theta_0$ in case of normal

population $N(\theta, \sigma^2)$, assuming σ^2 to be known. Also obtain power of test.   4

8. Let $X_1, X_2,...,X_m$ be iid $B(n,p)$ random variables. Both n and p are unknown. Estimate n and p by method of moments.   4

SECTION—C

9. Write short notes on the following :   7×2=14

 (i) What is likelihood function? How does it differ from joint density function ?

 (ii) Define the Minimal sufficient statistic. How does it help in Data reduction?

 (iii) Define the Unbiasedness. If T is unbiased estimator of θ, show that T^2 is not unbiased for θ^2.

 (iv) Obtain MVUE of θ if random sample of size

n is down from a population with :

$$\text{pdf } f(x,\theta) = \begin{cases} \theta e^{-\theta x} &, \quad 0 < x < \infty, \theta > 0 \\ 0 &, \quad \text{Otherwise.} \end{cases}$$

 (v) Explain one tailed and two tailed Tests.

 (vi) If a sufficient estimator exist, show that it's a function of MLE.

 (vii) Show that a MPCR for the test may be expressed in terms of marginal distribution of Sufficient statistic.