22P254 (Pages: 2) Name: ....

Reg.No: ....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P MST2 C07 - ESTIMATION THEORY

(Statistics)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Part-A

Answer any ***four*** questions. Each question carries 2 weightage.

1. Define Fisher Information.Let $x_1, x_2, \ldots, x_n$ be a random sample of 'n' observations from $N(0, \theta)$. Find Fisher information.
2. Define i)Minimal Sufficient statistic ii)Ancillary Statistic
3. Define Fisher Information.Let $x_1, x_2, \ldots, x_n$ be a random sample of 'n' observations from $N(0, \theta)$. Find Fisher information.
4. Explain the method of percentiles for estimation of parameters.
5. Let $X \sim N(\mu, \sigma^2)$.Find MLE for μ and σ^2.
6. Explain Loss function and different types of loss function.
7. Find shortest length confidence inetrval for $U(0, \theta)$

(4 × 2 = 8 Weightage)

Part-B

Answer any ***four*** questions. Each question carries 3 weightage.

8. Define Unbiased estimator.Let $x_1, x_2, \ldots, x_n$ where $n \geq 2$ is a random sample from Bernoulli distribution with parameter θ.Show that $\frac{T(T-1)}{n(n-1)}$ is an ubiased estimator for θ^2
9. Define MVBE. Obtain the MVBE estimators in $N(\mu, \sigma^2)$.Find its variance.
10. State and Prove Cramer-Rao inequality.
11. i)Define Consistency.Explain the sufficient condition for consistency.
    ii)Let $x_1, x_2, \ldots, x_n$ be a random sample drawn from $exp(\theta)$ .Find Consistent estimator for $\frac{\theta}{\theta+1}$.
12. Define CAN estimator. Let $x \sim exp(1/\theta)$.Show that $\bar{x}$ is CAN for θ.
13. Let $x \sim B(n, p)$ and assume that the prior distribution of x to be $U(0, 1)$.Find the Bayes estimate and Bayes risk taking the loss function to be $L(\theta, t) = \frac{(\theta - t^2)}{(\theta(1-\theta))}$.

14. Explain : a)Shortest expected confidence interval b)Large sample confidence interval.

(4 × 3 = 12 Weightage)

Part-C

Answer any ***two*** questions. Each question carries 5 weightage.

15. i) State and prove Rao-Blackwell theorem

    ii) Let $x_1, x_2, \ldots, x_n$be a random sample from $N(\theta, 1)$.Find the UMVUE of θ and θ^2.

16. i) Find moment estimator of parametres of Gamma distribution. .

    ii) Define aCAN estimator.Explain the invariance property of CAN estimators.

17. a) Explain Cramer family

    b) State and prove Cramer-Huzurbazar theorem

18. i) Define pivote.Describe the method of construction of confidence interval using pivot.

    ii) Find the $100(1-\alpha)\%$ shortest length confidence inetrval for variance of normal disrtibution based on 'n' observation.

(2 × 5 = 10 Weightage)

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