21P254 (Pages: 2) Name: ....

Reg.No: ....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2022

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P ST2 C07 - ESTIMATION THEORY

(Statistics)

(2019 Admission onwards)

Time : 3 HoursMaximum : 30 Weightage

Part-A

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

1. if $x_1,x_2,...x_n$ be i.i.d random samples from exponential with parameter θ. Show that $T(x)=\sum_{i=1}^{n} x_i$ is sufficient for θ.
2. Explain Minimal Sufficient Statistic.In $N(\theta,1)$,Show that $\bar{x}$ is a Minimal Sufficient statistic for θ
3. Define Fisher information. Let $x_1,x_2,...,x_n$ be i.i.d. random variables which follows Poisson distribution with parameter λ. Find Fisher information.
4. Find moment estimator of θ in $U(0,\theta)$.
5. Let $X\sim N(\mu,\sigma^2)$.Find MLE for μ and σ^2.
6. Give an example which is the member of one parameter cramer family of distribution.
7. Explain shortest length confidence inetrval.

(4 × 2 = 8 Weightage)

Part-B

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

8. Let $x_1,x_2,...,x_n$ be random sample from i.i.d. $N(\mu,\sigma^2)$. Show that $T_1(x)=\sum_{i=1}^{n} x_i, T_2(x)=\sum_{i=1}^{n} x_i^2$ are jointly sufficient for μ,σ^2.
9. Let $X\sim N(0,\sigma^2)$ Find MVBE of σ^2
10. Find Cramer-Rao lower bound for variance of the unbiased estimator of θ with $f(x;\theta)=\theta(1-\theta), x=0,1,2,..., and 0<\theta<1$
11. Let $x_1,x_2,...,x_n$be i.i.d observations from $P(\lambda)$ .Find a consistent estimator of $e^{-\lambda}$.
12. Let $x_1,x_2,...,x_n$ be a random sample of size 'n' from $N(\mu,\sigma^2)$ .if $T_n=\bar{x}$, show that T_n is a CAN estimator.

13. Let $X\sim B(n,p)X\sim B(n,p)$ and let $\pi(P)\pi(P)$ be the prior density having Beta distribution with pamerter m,km,k. find the bayes estimator of pp. If random variable xx assumes i.i.d.

14. Find the $100(1-\alpha)\%100(1-\alpha)\%$ shortest length confidence interval for $\theta\theta$ when $X\sim N(\theta,1)X\sim N(\theta,1)$

(4 × 3 = 12 Weightage)

Part-C

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

15. a) Define i) UMVUE i) MVUE
    b) State and prove Lehman-Scheffe theorem

16. i)State and prove invariance property of consisitent estimator
    ii)Find a consistent estimator $e^{-\lambda}e-\lambda$ of if $x\sim P(\lambda)x\sim P(\lambda)$.

17. Give an example to prove that a family which is not a exponential family but is a cramer family.

18. Based on a sample drawn from $N(\mu,\sigma^2)N(\mu,\sigma 2)$ with $\sigma^2\sigma 2$ is known, construct a $100(1-\alpha)\%100(1-\alpha)\%$ C.I for $\mu\mu$.

(2 × 5 = 10 Weightage)

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