LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FOURTH SEMESTER – **APRIL 2024**

UST 4501 – ESTIMATION THEORY

Date: 08-04-2024 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

Part-A

Answer ALL the Questions **(10 x 2= 20)**

1.	Define unbiased estimator with an example.
2.	State the invariance property of consistent estimator.
3.	Define Sufficient Statistic.
4.	Define UMVUE.
5.	Define Completeness.
6.	State any two methods of estimation.
7.	Define Least square estimator.
8.	Define Posterior Distribution.
9.	What do you mean by Loss function?
10.	What is interval estimation?

Part-B

Answer any FOUR of the following **(4 x 10 = 40)**

11.	State and Prove Cramer Rao Inequality.
12.	State and prove the sufficient condition for an estimator to be consistent?
13.	State and prove Factorization theorem.
14.	Let $X_1, X_2, \ldots X_n$ be a random sample from U(0, θ) Population. Obtain MVUE for θ .
15.	Obtain the MVB estimator for μ in normal population N(μ, σ^2), where σ^2 is known.
16.	List the properties of M.L.E.
17.	Let $X_1, X_2, \ldots X_n$ denote a random sample from the Bernoulli density function $f(x/\theta)=\theta^x(1-\theta)^{1-x}$ for x=0,1. Assume that the prior distribution is uniformly distributed over the interval (0,1). Find the Posterior Bayes estimator of θ
18.	Determine $100(1-\alpha)\%$ confidence interval for mean of normal distribution when S.D is unknown.

Part-C

Answer any Two Questions **(2 x 20 = 40)**

19.	a). State and prove Rao Blackwell theorem. **(10 Marks)** b) Prove that for Cauchy's distribution, sample median is a consistent estimator of the population

	mean. **(10 Marks)**
20.	a). State and Prove Lehmann Scheffe theorem. **(10 Marks)** b). Let X_1, X_2,…… Xn be a random sample from Bernoulli distribution f(x ,θ)= $\theta^x (1-\theta)^{1-x}$ x=0,1. Find the complete sufficient statistic for θ. **(10 Marks)**
21.	a). Describe the method of moments. Find method of moment estimators of the normal parameters μ and σ^2. **(10 Marks)** b). Derive the Cramer-Rao Lower Bound for estimating μ in N (μ, 1), and obtain minimum variance bound unbiased estimator for μ . **(10 Marks)**
22.	a). Obtain Confidence interval for ratio of variances of two normal populations. **(10 Marks)** b). Show that the posterior mean is the Bayes estimator with respect to squared error loss. **(10 Marks)**

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