LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2019**

ST 4503– ESTIMATION THEORY

Date: 11-04-2019 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

Part –A

Answer all the questions: **(10x2=20)**

1. Define unbiased estimator with an examples.
2. State the invariance property of consistent estimator.
3. Define UMVUE.
4. Define completeness.
5. State any two methods of estimation.
6. Write the normal equation for estimating the unknown parameter by the method of least squares.
7. Define posterior distribution.
8. Define Bayes estimator.
9. Define confidence interval.
10. What is confidence coefficient?

Part –B

Answer any FIVE questions **(5*8=40)**

11. State and prove Cramer Rao Inequality.
12. State and prove factorization theorem on sufficient statistic.
13. Describe the methods of minimum Chi – square.
14. Let $X_1, X_2, \dots, X_n$ denote a random sample from the Bernoulli density $f\left(\frac{x}{\theta}\right) = {}^{-x}(1 - {}^{-})^{1-x}$ for $x = 0, 1$. Assume that prior distribution is uniformly distributed over the interval (0 ,1). Find the posterior Bayes estimator of θ.
15. Determine 100(1 - α)% confidence interval for mean of normal distribution when S.D is unknown.
16. Let $X_1, X_2, \dots, X_n$ be a random sample from $U\ (0, {}^{-})$ population. Obtain MVUE for θ.
17. Obtain the MVB estimator for μ in normal population $N(\mu, \sigma^2)$, where σ^2 is known.
18. List the properties of M.L.E.

Part –C

Answer any TWO questions **(2*20=40)**

19. (a). State and prove the sufficient conditions for consistency.

    (b). Obtain the consistent estimator of θ in the case of Poisson P(θ). Also obtain the consistent estimator of $e^{-\theta}$.

20. (a). $X_1, X_2, \dots, X_n$ be a random sample from normal distribution. Find the sufficient statistic for mean and variance.

    (b). State and prove Rao Blackwell theorem.

21. (a). Find the MLE for the parameter μ of a normal distribution on the basis of a sample of size n, σ^2 is known. Find also its variance.

    (b). Derive the confidence interval for variance when μ is unknown in the case of $N(\mu, \sigma^2)$.

22. (a). Describe the method of moments.

    (b). $X_1, X_2, \dots, X_n$ is a random sample from a normal population $N(\mu, 1)$. Find the unbiased estimator of $«^2 + 1$.

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