LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2016**

ST 4503/ST 5504/ST 5500 – ESTIMATION THEORY

Date: 20-04-2016 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

PART – A **(10 x 2 = 20 marks)**

Answer ALL the Questions

1. Define Parameter.
2. Define Unbiased Estimator.
3. What is meant by Sufficiency?
4. State Factorization Theorem.
5. Write any four methods for estimating a parameter.
6. Define Likelihood function.
7. Define Baye's estimators.
8. Define completeness of a family of distributions.
9. What is the need of studying confidence interval?
10. Define confidence limits.

PART – B **(5 x 8 = 40 marks)**

Answer any FIVE the Questions

11. Explain the concept of consistent estimator and also show that in sampling from a $N(\mu,\sigma^2)$ population, the sample mean is a consistent estimator of μ.
12. If T_1 and T_2 are unbiased estimators of θ, show that one can get infinitely many unbiased estimators of θ.
13. Let $x_1, x_2, x_3, \ldots, X_n$ be a random sample from $N(\mu,\sigma^2)$ population. Find the sufficient estimators for μ & σ^2.
14. Find the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of a sample of size 'n' and find its variance.
15. Discuss the concept involved in the method of Least Squares.
16. Distinguish between posterior and prior distributions.
17. Find 100(1- α) % confidence intervals for the parameter μ when σ^2 is unknown in the normal distribution.
18. Explain about the method of minimum chi-square.

PART – C (2 x 20 = 40 marks)

Answer any TWO Questions

19. a) State and prove Cramer-Rao Inequality.

    b) If T_n is a consistent estimator of $\gamma(\theta)$ and $\Psi\{\gamma(\theta)\}$ is a continuous function of $\gamma(\theta)$, then prove that $\Psi(T_n)$ is a consistent estimator of $\Psi\{\gamma(\theta)\}$.

20. a) State and prove Rao-Blackwell theorem.

    b) Show that for large samples, method of maximum likelihood and method of minimum chi-square provide identical estimators.

21. a) Describe the procedure of Maximum Likelihood Estimation.

    b) In random sampling from normal population $N(\mu,\sigma^2)$, find the maximum likelihood estimators (MLE) for i) μ when σ^2 is known ii) σ^2 when μ is known.

22. Obtain $100(1-\alpha)\%$ confidence limits for the difference of means when variances are known in sampling from two normal populations.

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