LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2018**

16/17UST3MC02– ESTIMATING THEORY

Date: 31-10-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

Part – A:

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

1. Define unbiased estimator. Give an example.
2. State any two regularity conditions.
3. State any two properties of UMVUE.
4. When $X_1, X_2, X_3, \ldots\ldots\ldots. X_n$ is random samples from Poisson distribution with parameter λ, suggest a sufficient statistic.
5. Explain the Method of Moment estimation.
6. State the least Square estimator of β_0, in the model $Y = \beta_0 + \beta_1 X + \varepsilon$.
7. What is a prior distribution? Give an example.
8. State a possible prior distribution for λ
9. State the 95% confidence interval for μ, when a random sample of size 'n' is drawn from N (μ,1).
10. With $\alpha_1<\alpha_2$, which of the two confidence intervals $(1-\alpha_1)100\%$ and $(1-\alpha_2)100\%$ is wider?

Part – B

Answer any FIVE questions: **(5x8=40)**

11. Derive an unbiased estimator of 'p' in Bernoulli distribution B (1,p), based on a random sample of size 'n'.
12. Describe efficient estimator with a suitable example.
13. Define completeness of an estimator and verify whether $\bar{x}$ is a complete estimator in case of a random sample of size 'n' from $N(\theta, 1), \theta \epsilon R$.
14. Describe the Method f minimum Chi – square estimation.
15. State any four properties of MLE.
16. Describe Loss function and Risk function with suitable example.

17. Describe posterior distribution? Give an example of a prior and posterior distribution.

18. Derive the 95% confidence interval for θ, when a random sample of size 'n' drawn from N (μ, σ^2) , $\theta \epsilon R$, where σ^2 is unknown.

Part - C

Answer any TWO Questions: **(2x20=40)**

19. a) State and prove Cramer – Rao inequality. **(12)**

b) Show that the family of Poisson distribution {P(λ), λ> 0) } is complete. **(8)**

20. a) State and prove Lehmann – Scheffe theorem. **(10)**

b) State and prove Rao – Blcakwell theorem. **(10)**

21. a). Explain the concept of estimation by the method of modified minimum chi-square. **(10)**

b) For a random sample of $X_1, X_2, X_3, \dots \dots \dots . X_n$ from N (μ, σ^2), $\sigma > 0, \mu \epsilon \mathcal{R}$, obtain the method of moments estimator of μ and σ^2. **(10)**

22. a) Let $X_1, X_2, X_3, \dots \dots \dots . X_n$ bea random sample from {P(λ), λ> 0) }, and let Gamma (α, β) be prior distribution for λ. Obtain the Bayesian estimator for λ. **(12)**

b) If $X_1, X_2, X_3, \dots \dots \dots . X_n$ and $Y_1, Y_2, Y_3, \dots \dots \dots . Y_m$ are random sample of size 'n' and 'm' respectively from N (μ_1, σ^2) and N (μ_2, σ^2). Derive the (1 - α)100% confidence interval for the differences in means μ_1 - μ_2. **(8)**

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