K24U 0750

Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, April 2024
(2019 to 2022 Admissions)
CORE COURSE IN STATISTICS
4B04STA : Statistical Inference – 1

Time : 3 Hours Max. Marks : 48

PART – A
(Short Answer)

Answer **all** questions : (6×1=6)

1. Define F statistic.
2. State the additive property of Chi square distribution.
3. Define minimum variance bound estimator.
4. T_1 and T_2 are two unbiased estimators of a parameter. When we say T_1 is more efficient than T_2 ?
5. What is Fisher information ?
6. Write the confidence interval for the mean of normal distribution when population standard deviation is unknown and n is small.

PART – B
(Short Essay)

Answer **any 7** questions : (7×2=14)

7. Define t distribution.
8. Find the method of moment estimator for both N and p in B(N, p) population.
9. Differentiate between point estimation and interval estimation.
10. Find the Cramer Rao lower bound for the variance of any unbiased estimator of λ where λ is the mean of the Exponential population.
11. Mention the properties of moment estimators.
12. Let $X_1, X_2, ..., X_n$ be a random sample of size n from Poisson population with parameter λ. Obtain an unbiased estimator of $e^{-\lambda}$.
13. Prove or disprove by an example that maximum likelihood estimates are always unbiased.

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14. State Cramer Rao inequality.
15. The mean of a sample of size 20 from a normal population $N(\mu, 8)$ was found to be 81.2. Find a 90% confidence interval for μ.

PART – C
(Essay)

Answer **any 4** questions : (4×4=16)

16. Derive the moment generating function of χ^2 distribution with n degrees of freedom.
17. Establish the relation between Chi square, t and F statistic.
18. Examine the sufficiency of $\sum x_i^2$ for σ^2 in the $N(0, \sigma^2)$ distribution.
19. Let $X_1, X_2, ..., X_n$ be a random sample of size n from $U[0, \theta]$ population. Obtain MVUE of θ.
20. Explain the construction of the confidence intervals for ratio of variances of two normal populations.
21. A random sample of 500 apples was taken from a large consignment and of these 65 were bad. Estimate the proportion of bad apples by a 90% confidence interval.

PART – D
(Long Essay)

Answer **any 2** questions : (2×6=12)

22. Derive the sampling distribution of sample mean when samples are taken from $N(\mu, \sigma^2)$.
23. Let $x_1, x_2, ..., x_n$ be a random sample of n observations from $N(\theta, 1)$. Find Fisher's measure of information in estimating θ.
24. Let $x_1, x_2, ..., x_n$ be a random sample from $N(\mu, \sigma^2)$ population. Find sufficient statistics for
    i) μ when σ^2 is known
    ii) σ^2 when μ is known
    iii) μ and σ^2 when both are unknown.
25. Obtain 95% confidence interval for the difference of means of a normal population $N(\mu_1, \sigma_1)$ and $N(\mu_2, \sigma_2)$ when
    i) σ_1 and σ_2 are known
    ii) σ_1 and σ_2 are unknown.

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