



K25U 0851

Reg. No. :

Name :

**IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/
Supplementary/Improvement) Examination, April 2025
(2019 to 2023 Admissions)**

**COMPLEMENTARY ELECTIVE COURSE IN STATISTICS FOR
MATHEMATICS/COMPUTER SCIENCE/COMPUTER SCIENCE WITH
AI AND ML
4C04STA : Statistical Inference**

Time : 3 Hours

Max. Marks : 40

Instruction : Use of calculators and statistical tables are permitted.

**PART – A
(Short Answer)**

Answer **all 6** questions.**(6×1=6)**

1. State Bernoulli's law of large numbers.
2. Define convergence in distribution.
3. When do you say that an estimator is unbiased ?
4. Write the confidence interval for mean of a normal population when population variance is known.
5. Write an example for composite hypothesis.
6. What do you mean by critical region of a statistical test procedure.

**PART – B
(Short Essay)**

Answer **any 6** questions.**(6×2=12)**

7. Write the demerits of Chebychev's inequality.
8. Write an example of an unbiased estimator, which is not consistent.
9. Explain method of maximum likelihood estimation.

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10. State Neyman-Pearson lemma.
11. Distinguish between type I error and type II error.
12. Explain null hypothesis and alternative hypothesis.
13. Write the test statistic and critical region for testing specified standard deviation of a normal population.
14. What do you mean by analysis of variance ?

**PART – C
(Essay)**

Answer **any 4** questions.**(4×3=12)**

15. State and prove Chebychev's inequality.
16. If X_i is a random variable which assumes values i and $-i$ with equal probabilities, examine whether weak law of large numbers holds for sequence X_k .
17. Let $x_1, x_2, \dots, x_n$ be a random sample from a population with probability density function $f(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}}, x > 0$ and $\theta > 0$. Show that sample mean, $\bar{x}$ is an unbiased estimator of θ .
18. Derive 95% confidence interval for variance of a normal population.
19. Discuss the chi-square test for independence of attributes.
20. A group of 6 students take a pre-test before the new teaching method is introduced. After a month of using the new method, they take a post-test. The test scores are shown below :

Student	A	B	C	D	E	F
Pre test score	25	22	28	20	24	26
Post test score	31	38	30	27	24	29

Test whether the new teaching method was effective. ($\alpha = 0.05$)

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**PART – D
(Long Essay)**

Answer **any 2** questions.**(2×5=10)**

21. Obtain moment estimator for μ and σ^2 of a normal population with mean μ and standard deviation σ based on a sample of size n .
22. If $x < 0.6$ is the critical region for testing $\theta = 1$ against the alternative $\theta = 1.5$ on the basis of a single observation from a population with pdf $f(x) = (1 + \theta)x^\theta, 0 < x < 1$ and $\theta > 0$, obtain level of significance and power of the test.
23. Describe the procedure of testing specified mean of a normal population based on a sample of size n when standard deviation is i) known and ii) unknown. Assume that $n < 30$.
24. The following table gives the yields of three strains of wheat cultivated in five identical plots each. Examine whether there is any indication of the strains differing in yield. ($\alpha = 0.05$)

A	25	28	31	28		
B	15	29	32	26	30	29
C	22	27	24	23	29	