D4BST2201 **(Pages 2)** **Reg.No:**.....

Name:.....

FOURTH SEMESTER B. Sc. DEGREE EXAMINATION, APRIL 2024

(Regular/Improvement/Supplementary)

STATISTICS: Complementary Course for Mathematics and Computer Science

GSTA4C04T: STATISTICAL INFERENCE AND QUALITY CONTROL

Time: 2 Hours **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries 2 marks. (Ceiling 20 marks)

1. Distinguish between an estimator and an estimate.
2. Give the confidence interval for the mean of a normal population when σ is known.
3. Give the test statistic for equality of means for small samples when population variances are known.
4. Define χ^2 test. Give an example.
5. Name any two applications of F test.
6. 'Sum of squares' is a measure of variance. Justify.
7. When should one opt for a non-parametric test?
8. What are the uses of Wald-Wolfowitz run test?
9. Give the test statistic corresponding to 2×2 contingency table.
10. What is meant by 3σ limit?
11. Write down the control limits for c chart.
12. Distinguish between variables and attributes.

SECTION B: Answer the following questions. Each carries 5 marks. (Ceiling 30 Marks)

13. For a population with mean μ and variance σ^2, verify whether $\bar{X} - \frac{1}{n}$ is consistent for μ.
14. Let $\bar{x} = 39$ be the mean of a random sample of size 16 and $S = 3$ be the sample standard deviation. Obtain the 99% confidence interval for the mean of a normal population.

15. A random sample of 35 light bulbs has a mean life of 2000 hours with a S.D. of 200 hours. Test at 1% level that the bulbs are taken from a lot having mean 2100 hours.

16. Define ANOVA. Give the ANOVA table for one way classification.

17. From the following table on a horticultural data, test the hypothesis that the flower colour is independent of the nature of leaves.

	White flowers	Red flowers
Flat leaves	99	20
Curled leaves	36	5

18. Define σ chart. How do we construct it?

19. Distinguish between random variation and assignable variation.

SECTION C: Answer any 1 question. Each carries 10 marks.

20. Estimate M.L.E. for random sampling from $N(\mu, \sigma^2)$ population.

    (a) for μ when σ^2 is known.

    (b) for σ^2 when μ is known.

    (c) for μ and σ^2 simultaneously.

21. Suppose $X \geq 1$ is the region of rejection based on a single sample from exponential population with mean $\frac{1}{\theta}$, where null and alternative hypotheses states that the value of θ are 2 and 1 respectively. Obtain the size and power of the test.

(1 x 10 = 10 Marks)