D4BST2301 (PAGES 2) **Reg. No.....**

Name: .....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2025

(Regular/Improvement/Supplementary)

STATISTICS: Complementary Course for Mathematics and Computer Science

GSTA4C04T: STATISTICAL INFERENCE AND QUALITY CONTROL

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

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 marks)

1. A coin is tossed 10,000 times and it turns up head 5195 times. Is it reasonable to think that the coin is unbiased? Test at $\alpha = 0.05$.
2. What is meant by Yate's correction?
3. Mention the types of control charts.
4. The following are the scores of 12 students in a competitive examination. Test whether the median score is above 200.
   203, 168, 187, 235, 197, 163, 214, 233, 179, 185, 197, 216
5. Give the test statistic for equality of means for large samples when population variances are known.
6. What is meant by point estimation?
7. Comment on MLE.
8. A sample of 10 observations gives a mean equal to 38 and standard deviation 4. Using t- test, can we conclude that the population mean is 40.
9. 'Sum of squares' is a measure of variance. Justify.
10. When should one opt for a non-parametric test?
11. Define specification limits.
12. What do you mean by assignable causes?

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 marks)

13. Obtain the confidence interval for the mean of a normal population when σ is unknown and n is small.
14. Find the probability of type I error and type II error, if H0 : p = 1/ 3 against H1 : p = 1 /2 with critical region X > 3 where X ~ B(4, p).

(PTO)

15. Describe two-way classification of data.
16. Find the M.L.E. of α if $f(x; \alpha) = \alpha e^{-\alpha x}$, $x > 0$, $\alpha > 0$.
17. The following data gives the time duration taken by workers to prepare a special mix, before lunch and after lunch. Using run test, examine whether the two data have the same distribution.

Before lunch:	9.4	9.8	11.1	11.2	14.0	11.8	12.1	12.5
After lunch:	16.4	15.8	15.4	14.0	12.2	11.8	11.2	11.4

(Take α 0.05 and table value =4).

18. The following table shows the number of missing rivets observed at the time of inspection of 12 aircrafts. Draw the control limits for the number of defects chart and comment on the state of control.

Aircrafts No:	1	2	3	4	5	6	7	8	9
		10	11	12					
No. of missing rivets:	7	15	13	18	10	14	13	10	20
		11	22	15					

19. 12 pieces of cloth out of different rolls of equal length contained the following number defects. 2, 3, 4, 3, 5, 0, 2, 0, 5, 4, 4, 3. Draw a control chart for the number of defects and state whether the process is in a state of statistical control.

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. Discuss in detail any four methods of estimation.
21. The following figures relate to production in kg. of three varieties A, B and C of wheat sown in 12 plots.

A : 14, 16, 18

B : 14, 13, 15, 22

C : 18, 16, 16, 19, 20

Is there any significant difference in the production of 3 varieties?

(1 x 10 = 10 Marks)