23U445 (Pages: 2) Name : .....

Reg. No : .....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2025

(CBCSS-UG)

(Regular/Supplementary/Improvement)

CC19U STA4 C04 - STATISTICAL INFERENCE AND QUALITY CONTROL

(Statistics - Complementary Course)

(2019 Admission onwards)

Time: 2 Hours Maximum: 60 Marks

Credit: 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Define likelihood function.
2. Define unbiasedness of estimators.
3. Show that sample mean is a consistent estimator of population mean.
4. Define efficient estimator.
5. Define sufficiency of an estimator.
6. Define size of a test.
7. When do you use paired t-test?
8. State the critical region for testng the equality of variances of two populations.
9. Write the hypothesis for testing two-way classification.
10. What is sign test?
11. Briefly explain Mann - Whiteny U test.
12. What do you mean by statistical quality control?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Estimate the parameter by the method of moments for a poisson population.
14. Construct a $100(1-\alpha)\%$ confidence interval for the mean of a normal population with known standard deviation.
15. Explain the method of constructing 95% confidence interval for the proportion 'p' of possessing a characteristic in a population.

16. Random samples drawn from two countries gave the following data relating to the nights of adult males.

	Country A	Country B
Mean height	67.42	67.25
Standard Deviation	2.5	2.25
Sample sizes	1000	1200

Is the difference between the means significant?

17. A factory works in two shifts, in the day shift, on an average out of 500 items produced, 30 are found to be defective and in the night shift on an average out of 400 items produced, 20 are found to be defective. It is known that the proportion of defective items that are manufactured is 0.052. Can we conclude that there is no significant difference between the two shifts so far as the efficiency is concerned?

18. Explain goodness of fit.

19. During an examination of equal legths of cloths, the following number of defects were observed. 2, 3, 4, 0, 5, 6, 7, 4, 3, 2. Draw the control chart for the number of defects and comment whether the process is under control.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. Find the maximum likelihood estimators for random sampling from a normal population $N(\mu, \sigma^2)$ for
(i) Population mean μ when the population variance σ^2 is known.
(ii) The population variance σ^2 when the population mean μ is known.

21. Perfom analysis of variance:

Plot 1	:	20	18	30	32	35	37	19		
Plot 2	:	24	22	26	28	30	32	28	26	
Plot 3	:	28	20	27	19	29	35	30	23	27	32

(1 × 10 = 10 Marks)

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