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(Pages: 2)

Name:

Reg.No:

FIFTH SEMESTER B.Voc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC21U SDC5 SI14 - STATISTICAL INFERENCE

(Information Technology - Skill Component Course)

(2021 Admission onwards)

Time : 2.5 Hours

Maximum : 80 Marks

Credit : 4

Part A (Short answer questions)

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

1. Define consistency.
2. Define efficiency.
3. List the names of various methods of estimation of a parameter.
4. Write down the confidence interval for the mean of two normal populations when the standard deviations are known.
5. Interpret the confidence interval for the variance of a normal population.
6. What is level of significance?
7. What is Type 1 error?
8. What is null hypothesis?
9. How is power related with Type 2 error?
10. State the test statistic used to test the mean of a normal population.
11. What is small sample test?
12. Which test is used for testing the equality of variances of two normal population?
13. What is the null hypothesis in a chi-square test for variances?
14. What is the alternative hypothesis in ANOVA?
15. What are the limitations of non-parametric tests?

(Ceiling: 25 Marks)

Part B (Paragraph questions)

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

16. If T is an unbiased estimator of θ , show that T^2 and $\sqrt{\bar{T}}$ are the biased estimators of θ^2 and $\sqrt{\theta}$ respectively

17. Explain method of moments.
18. In a survey, you asked two independent groups of people (Group A and Group B) whether they prefer product X. In Group A, out of 200 respondents, 40 prefer product X. In Group B, out of 250 respondents, 55 prefer product X. Calculate a 95% confidence interval for the difference in proportions between the two groups.
19. Find the probability of type I error of the test which reject H_0 if $X > 1 - \alpha$ in favour of H_1 if X has pdf, $f(x, \theta) = \theta x^{\theta-1}$, $0 < x < 1$ with $H_0 : \theta = 1$ and $H_1 : \theta = 2$. Find the power of the test.
20. You have two independent samples, Sample A and Sample B, from two different populations. Sample A has a mean of 60 and a standard deviation of 8, while Sample B has a mean of 55 and a standard deviation of 10. You want to test if there is a significant difference in the means of these populations. Perform an appropriate test at a 5% significance level.
21. Describe chi-square test for goodness of fit.
22. How do you calculate the test statistic in the sign test, and what distribution does it follow?
23. How does the Kruskal-Wallis test work, and what is its main objective?

(Ceiling: 35 Marks)

Part C (Essay questions)

Answer any *two* questions. Each question carries 10 marks.

24. (a) Derive the confidence interval for the difference of two means of a normal population when the standard deviations are known.
(b) A study wants to determine if two different teaching methods have a significant impact on student test scores. In Group 1, the average test score is 85 with a known standard deviation of 8, and in Group 2, the average test score is 88 with a known standard deviation of 7. A 95% confidence interval for the difference in the mean test scores is required. Group 1 has 30 students, and Group 2 has 25 students.
25. (a) Explain the procedure for testing the proportion of success of a population.
(b) In a survey of 250 people, 160 said they prefer product A. Is there enough evidence to suggest that more than 60% of people prefer product A at a significance level of 0.05?
26. Explain two way ANOVA.
27. For following dataset of paired observations given below perform the Wilcoxon signed-rank test
Before : [23, 28, 20, 35, 29]
After : [27, 30, 24, 40, 32]

(2 × 10 = 20 Marks)
