



K24U 0752

Reg. No. :

Name :

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, April 2024
(2019 to 2022 Admissions)

Complementary Elective Course in Statistics for B.Sc. Geography/
Psychology

4C04STA (G&P) : INFERENCE STATISTICS

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. Define estimator.
2. When do you say that an estimator is consistent ?
3. Define most powerful test.
4. Write the $100(1 - \alpha)\%$ confidence interval for the mean of a normal population when the population variance is known.
5. Write the test statistic corresponding to Mann-Whitney U test.
6. If the sample size is 25 and the test statistic value for the Chi-square test of goodness of fit is 8.35, would you reject the hypothesis at a 5% significance level ?

PART – B (Short Essay)

Answer **any 6** questions.

(6×2=12)

7. Define unbiasedness and sufficiency of an estimator. Write examples.
8. Define point estimation. Write the desirable properties of a good estimator.
9. Explain the relationship between type I and type II errors and the level of significance and power of the test.

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10. Distinguish between large sample test and small sample tests. Write examples for small sample tests.
11. Write the test statistic and the rejection rule corresponding to the large sample test for testing the equality of proportions of two independent populations.
12. Consider a Chi square test for testing the independence of two attributes A and B, where A has 3 categories and B has 4 categories. Write the mean and variance of its test statistic. If the test statistic value is 9.33, will you reject the hypothesis for 5% level of significance.
13. Write the assumptions of ANOVA test.
14. If the degrees of freedom corresponding to row and column in a two-way ANOVA table are 4 and 5 respectively, find the degrees of freedom for error and total.

PART – C (Essay)

Answer any 4 questions.

(4×3=12)

15. Let X_1, X_2 and X_3 be independent random variables taken from $N(\theta, \sigma^2)$. If $U = X_1 - X_2 + X_3$ and $W = X_1 + 3X_2 - 2X_3$ are two estimates of θ , find the most efficient estimator among U and W.
16. What is meant by statistical inference ? Define estimation and testing of statistical hypotheses.
17. Obtain $(1 - \alpha)100\%$ confidence interval for the difference of means of two independent populations.
18. The average monthly income of 500 families is found to be Rs. 8,500. Can we conclude that the average monthly income of the population is Rs. 8,750 with standard deviation of Rs. 50 ? Test at 5% level of significance.
19. For a given set of data the observed and the expected frequencies are as given below. Test the goodness of fit for 5 % level of significance.

Observed	40	56	110	88	14	12
Expected	10	50	100	100	50	10

20. Explain Kruskal-Wallis test.



PART – D (Long Essay)

Answer **any 2** questions.

(2×5=10)

- 21. Out of 500 students from College A, 350 got job placements, while 555 students out of 750 from College B got placements. Using this information, construct 99% and 95% confidence intervals for the difference in proportions of students who received placements from the two colleges.
- 22. The nicotine content in milligrams in two samples of tobacco are given. Assume that the nicotine content follows Normal distribution and test whether the sample come from populations with same variance.

Sample I	21	27	23	24	26
Sample II	26	24	31	27	22

- 23. Outline the procedure for conducting a large sample test for testing the equality of means of two independent populations.
- 24. Examine the hypothesis that three different fertilizers are equally effective based on the yields of wheat from 15 test plots as presented in the following table.

Fertilizer	Yield (in 100 Kg)				
Fertilizer A	52	60	62	65	70
Fertilizer B	60	63	65	72	75
Fertilizer C	40	55	50	60	61