U.G. 3rd Semester Examination - 2020

STATISTICS

[PROGRAMME]

Course Code : STAT-G-CC-1C

(Basics of Statistical Inference)

Full Marks : 50 (40+10) Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Notations and symbols have their usual meaning.

1. Answer any **five** questions: 2×5=10

   a) Define unbiased esitmator.

   b) What is test of significance?

   c) Give a measure of association for a contingency table.

   d) When is sign test used?

   e) Give a 100(1–α)% confidence interval for the mean of a normal population when population variance is unknown.

   f) What is the objective of Analysis of Variance?

   g) What is level of significance of a test?

   h) When is Randomized Block Design used?

2. Answer any **two** questions: 5×2=10

   a) Discuss the two types of error involved in a hypothesis testing problem. What is power of a test?

   b) Suppose X_1 and X_2 be iid observations from a $N(\mu, \sigma^2)$ population, where both μ and σ^2 are unknown. For estimating μ, consider two estimators $T_1 = (X_1 + X_2)/2$ and $T_2 = (2X_1 + 3X_2)/5$. Show that both T_1 and T_2 are unbiased for μ Which one of T_1 and T_2 would you prefer and why?

   c) Describe Wilcoxon two-sample test.

   d) How would you test for the equality of means of two normal population based on independent samples from each? State the assumption, if any. Also give a 100(1–α)% confidence interval for the difference of the two means.

3. Answer any **two** questions: 10×2=20

a) i) Discuss the p-value approach of test of significance. How can you test for the binomial proportion using this approach? 5

ii) Discuss how you can test for independence of two attributes in a 2×2 contingency table. 5

b) Write down the linear model for one-way classified data. Discuss the analysis of such data and present the ANOVA table for this analysis. 10

c) i) Discuss the three principles of a design of experiment. Name a design where all these three principles are followed. 5

ii) Write a note on Yates' correction. 5

d) i) How can you test for the null value of the correlation coefficient of a bivariate normal distribution? Write down the distribution of the test statistic under the null hypothesis. 5

ii) What is confidence interval of a real parameter? Set up a $100(1-\alpha)\%$ confidence interval for the mean of a normal population when the population variance is known. 5

[Internal Assessment: 10]

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