2018

CBCS

3rd Semester

STATISTICS

PAPER—GE3T

(Honours)

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Basics of Statistical Inference

Group—A

1. Answer any *five* questions : 5×2

(a) Explain the terms — estimation and testing of hypothesis.

(b) Define biasness and consistency.

(c) State the different assumptions in ANOVA.

(d) What do you mean by raplication and randomization ?

(e) Write the differences between parametric and non-parametric tests.

(f) Define size of a test and level of significance in the context of testing of hypothesis.

(g) Write down the 95% confidence interval for the population mean of a normal distribution with unknown mean μ and known variance σ^2, based on a random sample of size n from the distribution.

(h) What is the difference between exact test and approximate test ?

Group—B

2. Answer any *four* questions : 4×5

(a) Describe the method of maximum likelihood. What are the properties of a maximum-likelihood estimator ? 3+2

(b) Describe the chi-square test for goodness-of-fit. 5

(c) What is a treatment contrast ? When are two such contrasts said to be orthogonal ? 2+3

(d) Obtain critical difference for comparing means of two classes in one way classified data. 5

(e) Find the maximum likelihood estimator of $\frac{1}{p}$ for the observation x from the discrete distribution with *pmf.* 5

$$f(x) = p(1-p)^{x-1}, \text{ for } x = 1, 2, \ldots$$

(f) Stating the necessary assumptions, describe the sign test in the context of one sample problem. 5

Group—C

3. Answer any *one* question : 1×10

(a) Give the layout and analysis of completely randomized design (CRD). 10

(b) Suppose $x_1, x_2, \ldots, x_n$ are iid observations from the rectangular distribution with density

$$f_\theta(x) = \frac{1}{\theta},\ 0 \le x \le \theta .$$

Consider the critical region $x_{(n)} > 0.8$ for testing the hypothesis $Ho : \theta = 1$, where $x_{(n)}$ is the largest of $x_1, x_2, -, x_n$. What is the associated probability of Type-I error and what is the power function? 5+5

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Research Methodology

Group—A

1. Answer any *five* questions : 5×2

(a) What is the significance of research in modern times ?

(b) Define research problem.

(c) Distinguish between independent variable and dependent variable.

(d) What is longitudinal research ?

(e) What is extraneous variable ?

(f) Briefly discuss the different sources of data.

(g) Distinguish between parameter and statistic.

(h) Define correlation coefficient.

Group—B

2. Answer any *four* questions : 4×5

(a) Explain range and standard deviation.

(b) Distinguish between survey and experiment.

(c) Explain stratified random sampling method.

(d) What are the non-probability sampling methods ?

(e) Explain Likert scale. What are its advantages ?

(f) Distinguish between bivariate and multivariate analysis. Explain it with an example.

Group—C

3. Answer any *one* question : 1×10

(a) Explain the questionnaire method of data collection. Explain the difference between collection of data

through questionnaires and schedules. What are the essentials of a good questionnaire ?

(b) Explain carefully the different steps in research report writing.