DCST501

Reg. No. | | | | | | | | |

V Semester B.Sc. Degree Examination, February/March - 2024

STATISTICS

Sampling theory and Regression Analysis

PAPER : V

(NEP Scheme Freshers)

Time : 2½ Hours **Maximum Marks : 60**

Instructions to Candidates:

1. Answer any five sub-divsions from Section A and five questions from Section -B.
2. Scientific calculators are allowed.

SECTION - A

I. Answer any Five sub divisions from the following: **(5×3=15)**

1. a. What is Sampling? State its objectives.
   b. Explain lottery method of obtaining simple random samples.
   c. Show that sample mean is an unbiased estimator of population mean in SRSWR.
   d. What is stratified Random sampling? Mention its advantages.
   e. Explain Systematic sampling.
   f. State the assumptions of simple linear regression.
   g. State the sampling distributions of least squares estimators of the parameters of simple linear regression model and mention their properties.
   h. What is meant by
      i. Heteroscedasticity.
      ii. Auto correlation?
   i. What are Box - Cox transformation and Target variable? Explain.

SECTION - B

II. Answer any Five questions from the following. **(5×9=45)**

2. a. Distinguish between :
      i. Probability and Non - probability sampling.
      ii. Purposive and Snowball sampling.
   b. What are different sources of errors in a sample survey? Explain. **(4+5)**

P.T.O.

3. a. Explain the steps involved in planning and conducting a statistical investigation.

   b. What is a questionnaire? What are the precautions necessary in drafting a good questionnaire. **(5+4)**

4. a. Under SRSWOR, with usual notations, obtain an expression for the variance of sample mean.

   b. With usual notations under SRSWOR, prove that $E(s^2) = S^2$. **(5+4)**

5. a. Explain SRS for proportions. With usual notations obtain an expression for the estimate of the variance of the estimator of the total number of units possessing the given attribute in the population, under SRSWOR.

   b. Derive an expression for sample size in case of SRSWOR while estimating population proportion. **(4+5)**

6. Obtain an unbiased estimator of the population mean in the case of stratified random sampling and derive its variance. Also, write confidence interval for population mean. **(9)**

7. a. In stratified Random sampling, for a fixed sample size, show that the variance of the estimator of the population mean is minimum if n_h is proportional to $N_h S_h$ for h = 1,2,.....,L

   b. Prove that the Systematic sample mean is more precise than the mean of SRSWOR if $S^2wsy > S^2$. **(5+4)**

8. a. Obtain ordinary least square estimators of the parameters of simple linear regression model.

   b. Write a short note on 'lack of fit' with reference to simple linear regression. **(6+3)**