



NP – 234

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V Semester B.Sc. Examination, January/February 2025
(NEP) (Freshers/Repeaters)
STATISTICS

Paper – V : Sampling Theory and Regression Analysis

Time : 2½ Hours

Max. Marks : 60

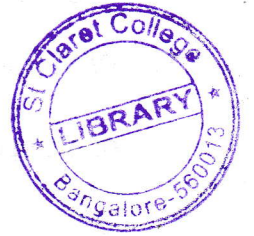
- Instructions :** i) Scientific calculators are **permitted**.
ii) Statistical tables and graph sheets are provided on request.

PART – A

Answer **any four** questions (2 marks **each**) :

(2×4=8)

1. Define sample with an example.
2. What do you mean by Standard Error (S.E.) ?
3. Define Simple Random Sampling (SRS).
4. With usual notations, prove that $E(p) = P$.
5. Mention any two merits of systematic sampling.
6. What do you mean by regression ?



PART – B

Answer **any four** questions (5 marks **each**).

(5×4=20)

7. Explain the types of sampling.
8. Prove that the probability of selecting a specified unit of a population at any given draw is equal to the probability of its being selected at the first draw. i.e., $p(E_r) = p(E_1)$.
9. Explain the lottery system method of drawing a sample.
10. Prove that $E(\bar{y}_{st}) = \bar{y}_N$.

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11. Explain systematic sampling and mention its important notations and terminologies.
12. Give the test procedure for testing $H_0 : \beta_1 = \beta_{10}$ of $Y = \beta_0 + \beta_1 X$.

PART – C

Answer **any four** questions (8 marks **each**) :

(8×4=32)

13. Explain the sampling and non-sampling errors.
14. In SRSWOR, prove that sample mean square is an unbiased estimate of the population mean square i.e. $E(S^2) = S^2$.
15. a) Distinguish between SRSWOR and SRSWR.

b) Explain the advantages and disadvantages of SRS.

(2+6)

16. Under proportional allocation derive an expression for n_i . Also find the $V(\bar{y}_{st})$ under proportional allocation.

17. With usual notations prove that in linear systematic sampling variance

of sample mean is given by $\text{Var}(\bar{y}_{\text{sys}}) = \frac{N-1}{N} \cdot S^2 - \frac{(n-1)K}{N} S_{\text{wsy}}^2$ where

$S_{\text{wsy}}^2 = \frac{1}{K(n-1)} \sum_{i=1}^k \sum_{j=1}^n (y_{ij} - \bar{y}_i)^2$ is the mean square among units which lie within the same systematic sample.

18. Derive the simple linear regression equation.