NP – 234

29

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 $E(\bar{y}_{st}) = \bar{y}_N$.

P.T.O.

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 $Var(\bar{y}_{sys}) = \frac{N-1}{N} \cdot S^2 - \frac{(n-1)K}{N} S^2_{wsy}$ where $S^2_{wsy} = \frac{1}{K(n-1)} \sum_{i=1}^{k} \sum_{j=1}^{n} \left(y_{ij} - \bar{y}_i\right)^2$ is the mean square among units which lie within the same systematic sample.

18. Derive the simple linear regression equation.