

RAN-2303081201040004

M.Sc. (Sem.-I) Examination November - 2025
Statistics : EC-Sampling Theory-I (Paper-1042)

Time: 3 Hours]
[Total Marks: 70
સૂચના : / Instructions

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book
- (2) Attempt all questions.
- (3) Each question carries 14 marks.
- (4) Answer any two out of the three bits given in each question.
- (5) Draw the figure and give example wherever necessary.

Seat No.:

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Student's Signature

- Q.1.** i. Define the following with suitable examples: Population. Parameter, Sample, Statistics, Estimator, MSE, Standard error
 ii. Discuss sample survey against complete enumeration with suitable examples and statistical arguments,
 iii. A sample of size n is selected by SRSWOR from a population of size N . Show that the sample proportion is an unbiased estimator of the population proportion. Also obtain its variance and an unbiased estimator of the variance.
- Q.2.** i. Discuss pilot survey and explanatory survey giving suitable examples,
 ii. A finite Population contains N units. The value of one specific unit being known to be y_0 . From the remaining $N-1$ units a simple random sample without replacement of size n is drawn. Let $\bar{y}_{(n)}$ denote the sample mean from this draw.
 1. Show that an unbiased estimator of the population total is

$$\hat{T}_1 = y_0 + (N - 1) \bar{y}_{(n)}$$

 2. Compare the variance of $\hat{T}_1$ with the variance of the mean per unit estimator of the population total $\hat{T}_2 = N\bar{y}_n$, discuss your findings.
 iii. A sample of size n is selected by SRSWR from a population of size N . Show that the sample mean is an unbiased estimator of the population mean. Also obtain its variance and an unbiased estimator of the variance.
- Q.3.** i. Discuss the need of non-probabilistic sampling techniques. Explain Area Sampling technique and Snow ball Sampling technique.
 ii. Discuss Methods of Collecting Information for a Sample Survey.
 iii. Discuss sampling error, non-sampling error and problem of non response in context of sample survey and census.
- Q.4.** i. Explain the need of stratification and the procedure to select a stratified random sample. Which are the main problems that one faces while adopting this sampling scheme and how are they addressed?
 ii. Discuss the problem of allocation in detail.
 iii. Discuss the estimation of population total under stratified random sampling.
- Q.5.** i. Write a detailed note on sample size determination.
 ii. Discuss different steps of a sample survey.
 iii. Write a detailed note on Cronbach Alpha.