



RAN-2303081801040003

M.Sc. (Sem.- I) Examination November - 2025 Applied 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: Sampling Unit, Sample, Sampled unit, Parameter, Statistics, estimator, bias of an estimator.
- (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 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 estimation of population mean under stratified random sampling.
- (ii) Write a detailed note on the problem of allocation.
- (iii) Discuss the estimation of population proportion under stratified random sampling.
- Q.3.** (i) Write a detailed note on pilot Survey and Exploratory Survey.
- (ii) Discuss different steps of a sample survey.
- (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.4.** (i) Discuss the need of non-probabilistic sampling techniques. Explain Area Sampling technique, quota Sampling technique and purposive sampling technique.
- (ii) Discuss sampling error, non-sampling error and problem of non response in context of sample survey and census,
- (iii) Discuss probabilistic sampling techniques verses non-probabilistic techniques.
- Q.5.** (i) Write a detailed note on Sample size determination.
- (ii) Write a detailed note on Cronbach Alpha.
- (iii) Discuss Methods of Collecting Information for a Sample Survey.