

Reg. No. :

Name :

Second Semester M.A./M.Sc./M.Com. Degree (Regular/Supplementary/
Improvement) Examination, March 2012

STATISTICS

Paper – 2.2 : Sampling Theory

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Answer five questions without omitting any Unit.
2) All questions carry equal marks.

UNIT – 1

- I. a) Define SRSWOR and SRSWR. Derive the sampling variance of the estimator of the population mean under SRSWOR and its unbiased estimator.
b) From a finite population a simple random sample has to be drawn. How do you determine the sample size and under what assumptions ?
- II. a) Explain the basic principles of survey sampling.
b) Show that the sample proportion under SRSWOR is unbiased for the population proportion and derive its sampling variance. Also obtain $(1 - \alpha)$ 100% confidence limits for population proportion.

UNIT – 2

- III. Discuss the problem of stratification. Obtain the optimum allocation for a fixed total sample size under stratified sampling. State the merits and demerits of this allocation compared to proportional allocation and simple random sampling (without replacement).
- IV. a) Show that systematic sampling is precise only when units within the sample are heterogeneous. Also compare the precision of systematic sampling with that of SRSWR and stratified random sampling.
b) Discuss the various considerations involved in construction of strata.



UNIT – 3

- V. a) Describe PPS sampling. What are its advantages over equal probability sampling? Explain Lahiri's method of choosing a PPS sample and obtain an unbiased estimator of population total and its variance.
- b) Distinguish between ordered and unordered estimators.
- VI. a) Define Hausen-Hurwitz estimator of population total under PPS sampling with replacement. Evaluate its sampling variance and suggest an estimator for the same.
- b) Distinguish between Desraj's ordered estimator and Murthy's unordered estimator.

UNIT – 4

- VII. a) Describe ratio estimator. Derive approximate variance of the ratio estimator and compare with that of the usual estimator based on the study character under SRSWOR.
- b) Obtain the bias of the ratio estimate.
- VIII. a) Explain linear regression estimation. In the linear regression estimate $\bar{y}_{er} = \bar{y} + b_o(\bar{X} - \bar{x})$, find out the best value of b_o which minimizes $v(\bar{y}_{er})$.
- b) Compare the efficiency of linear regression estimator with ratio estimate and the mean per unit.

UNIT – 5

- IX. a) For cluster sampling with equal size clusters obtain its efficiency with respect to SRSWOR using intra-class correlation coefficient. Discuss the situations when you would prefer cluster sampling to SRSWOR.
- b) What is cluster sampling? How is it different from stratified sampling? Explain its utility in sample surveys.
- X. a) With suitable examples, explain two stage sampling procedure. Obtain the allocation of sample size to the two stages, assuming equal first stage and the cost of the survey to be proportional to the size of the sample.
- b) Distinguish between multistage and multiphase sampling.