

Reg. No. :

Name :

II Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.) Examination, April 2011
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) Discuss the relative merits and demerits of sampling method over complete enumeration.
- b) State the problem of estimating sample size. Obtain the formula for n
- i) in sampling for proportions
- ii) with continuous data. **14**
- II. a) In simple random sampling without replacement (SRSWOR), show that the sample mean \bar{y} is unbiased for population mean \bar{Y} . Evaluate sampling variance of \bar{y} . How is it estimated unbiasedly ?
- b) Determine the standard error of the sample proportion when a SRS is drawn from a finite population. **14**

UNIT – 2

- III. a) Discuss the problem of allocation in stratified sampling. Obtain the optimum total size of the sample and its allocation in various strata when
- i) the total cost is fixed
- ii) the variance is fixed and the cost of surveying a unit differs from stratum to stratum.
- b) Explain stratified random sampling for proportions. **14**

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- IV. a) What is systematic sampling ? Give the circumstances under which it is to be preferred to simple random sampling. Explain how you will estimate the variance of a systematic sample with a random start.
- b) Show that $V_{st} \leq V_{sy} \leq V_{ram}$, when the sampling is made from a population which has linear trend. 14

UNIT – 3

- V. a) Explain PPS sampling. Describe Midzuno's method of choosing a PPS sample and obtain an unbiased estimator of population total and its variance.
- b) What is Desraj's ordered estimator ? Obtain the unbiased estimator proposed by Desraj and find its variance. 14
- VI. a) Compare Murthy's unordered estimator with that of Desraj's ordered estimator. Obtain the sampling variance of Murthy's estimator.
- b) Obtain the sampling variance of Harvitz-Thompson estimator of population mean in PPSWOR sampling. Express the same in Yates-Grendy form. 14

UNIT – 4

- VII. a) Explain how the ratio estimator is made unbiased. Obtain the variance of the unbiased ratio estimator and discuss about the efficiency of the same.
- b) Obtain the conditions under which the ratio estimator is a BLUE (Best Linear Unbiased Estimator). 14
- VIII. a) Explain regression method of estimation. Evaluate the MSE of the regression estimator. When is this estimator superior to mean per unit estimator ?
- b) For the linear regression estimate $\bar{y}_{ln} = \bar{y} + b_0(\bar{X} - \bar{x})$, obtain the best value of b_0 which minimizes $v(\bar{y}_{lr})$. 14



UNIT – 5

- IX. a) Describe cluster sampling. Suggest two estimators of population mean under cluster sampling, when the clusters are of unequal size. Obtain their sampling variances and discuss the relative advantages and disadvantages. 14
- b) Briefly write about multistage sampling and the situations in which it can be used. 14
- X. a) Explain two-stage sampling methods. Illustrate with examples when this sampling is useful. Critically compare it with one-stage sampling method. 14
- b) Obtain the variance of the estimated mean in two stage sampling. Also obtain the expression for the unbiased estimate of variance. 14