

MANGALORE UNIVERSITY
Department of Statistics

STH404: THEORY OF SAMPLING

Hours/Week: 4
Credits : 4

I.A. Marks: 30
Exam. Marks: 70

Course Outcomes:

- CO1: Understand the principles underlying sampling as a means of making inferences about a population
- CO2: Learn the different sampling techniques and able to apply the same in different area and able to analyze data from multi-stage surveys
- CO3: Apply the statistical method to get response in case sensitive matter and able to analyse the data to get accurate results
- CO4: Learn the concepts of ratio and regression method of estimation, estimate the bias and sampling variability and straggles for reducing these
- CO5: Compute the HDI from data, interpretation of results and understand need, importance of measuring inequality in income and concept of NSS and CSO
- CO6: Understand and solve the practical issues arising in sampling studies

UNIT I

(12 hrs)

Basic Concepts: Sampling design, sampling scheme, sampling strategy, interpenetrating subsampling. Probability Proportion to Size with Replacement (PPSWR) Sampling: Selection of PPSWR sample. Estimation of population mean, total and their sampling variances – Hansen-Hurwitz strategy. Estimation of sampling variance. Comparison with SRSWR, Estimation of Gain due to PPSWR sampling.

UNIT II

10 hrs.

Varying Probability Without Replacement (PPSWOR) Sampling: Some properties of sampling design, Horwitz-Thompson estimator, sampling variance of population total and its unbiased estimator. Sen-Midzuno Sampling Scheme, Des-Raj's Ordered estimator (general case), Murthy's unordering principle (sample of size two), Rao-Hartley-Cochran sampling strategy.

UNIT III	12 hrs.
Single stage cluster sampling: Concepts, estimation of efficiency of cluster sampling, clusters of varying sizes. Two stage sampling: Notions, estimation of population total and its variance, when SRSWR is used at first stage and SRSWOR at the second stage, SRSWOR at both stages and PPSWR at the first stage and SRSWOR at the second stage. Efficiency of two-stage sampling relative to cluster and SRS sampling.	
Unit IV	10 hrs.
Ratio and regression estimators based on SRSWOR, method of sampling, bias and mean square errors, comparison with mean per unit estimator. Two phase sampling: notion, double sampling for ratio estimation, double sampling for regression estimation.	
Unit V	8hrs
Randomized response techniques: Warner's model, related and unrelated questionnaire methods, Nonsampling errors. Statistics for National Development: NSO, CSO, Human Development Index, measuring inequality in income: Lorenz Curve, Gini coefficient	
REFERENCE BOOKS: 1. Hadley, G.(1987): Linear Algebra, Narosa 2. Rao, C.R. (1973): Linear Statistical Inference and its Applications, second edition, Wiley. 3. Searle S.R.(1982): Matrix Algebra Useful for Statistics, John Wiley& Sons. 4. John Verzani(2005), "Using R for Introductory Statistics", Chapman & Hall/CRC 5. Alain F. Zurek. al. (2009) "A Beginner's Guide to R. Use R! Series" Springer. 6. Phil Spector (2008), "Data Manipulation with R. Use R! Series", Springer. 7. A. Ramachandra Rao, and P. Bhimasankaram (2000), "Linear Algebra", Hindustan Book Agency.	