

SEMESTER-IV

STATISTICS MAJOR

STAT-MD-CC4-4-Th/STAT-MD-MC5-6-Th

3 Credits

(Design of Experiments –I and Sample Survey-I)

THEORY

Design of Experiments-I:

Analysis of Variance: Factors, types and effects; Fixed, random and mixed effects models; Analysis of one-way and two-way classified data with the equal number of observations in each cell (Fixed Effects Models only). (10)

Experimental designs: Treatments, Experimental units & Blocks, Experimental error, Basic principles of Design of Experiments (Fisher). (2)

Basic designs: Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) – layout, model, Applications of the techniques of ANOVA to the analysis of the above designs. Missing plot techniques in RBD and LSD. Uniformity trial experiments and comparison of designs. (10)

Sample Survey I:

Concept of population and sample, complete enumeration versus sampling, sampling and non-sampling errors. Types of sampling: non-probability and probability sampling, basic principle of sample survey, simple random sampling with and without replacement, random numbers, procedure of selecting a sample, estimates of population mean, total and proportion, standard errors of these estimates, estimates of their standard errors. (15)

Stratified random sampling: Technique, estimates of population mean and total, variances of these estimates, proportional and optimum allocations and their comparison with SRS. (4)

Two-stage sampling (with primary units of equal size and equal selection probability at each stage): unbiased estimation of population mean and total. Ideas of snowball sampling, purposive sampling. (4)

STAT-MD-CC4-4-P/STAT-MD-MC5-6-P

1Credit

(Design of Experiments I and Sample Survey I)

PRACTICAL

List of Suggested Practical

- Analysis of Variance of a one-way classified data (fixed effects model).
- Analysis of Variance of a two-way classified data with one observation per cell (fixed effects model).
- Analysis of Variance of a two-way classified data with more than one observation per cell (fixed effects model).
- Analysis of a CRD.
- Analysis of an RBD.
- Analysis of an LSD.
- Analysis of an RBD with one missing observation.
- Analysis of an LSD with one missing observation.
- To select a simple random sample with and without replacement.
- Simple random sampling – estimation of population mean, total and proportion; estimation of related standard error.
- Estimate the sample size for SRSWOR.
- Stratified Sampling – estimation of population mean and total, allocation of sample to strata by proportional and Neyman's methods, Comparison of the efficiencies of the above two methods relative to SRS.
- Estimation of gain in precision in stratified sampling.
- Two-stage Sampling – estimation of population mean and total.

Reference Books:

- Rencher, A. C. and Snee, R. W.: Linear Models in Statistics (Second edition), John Wiley and Sons.
- Scheffe, H.: The Analysis of Variance, John Wiley.
- Cochran, W. G. and Cox, G. M.: Experimental Design. Asia Publishing House.
- Das, M. N. and Giri, N. C.: Design and Analysis of Experiments. Wiley Eastern Ltd.
- Kempthorne, O.: The Design and Analysis of Experiments. John Wiley.
- Montgomery, D. C.: Design and Analysis of Experiments, John Wiley.

- Wu, C.F.J. And Hamada, M.: Experiments, Analysis, and Parameter Design Optimization (Second edition), John Wiley.
- Dean, A.M. and Voss, D.: Design and Analysis of Experiments. Springer Texts in Statistics.
- Goon, A.M., Gupta, M.K., Das Gupta, B.: An Outline of Statistical Theory, Vol-II, World Press, Calcutta.
- Goon A.M., Gupta M.K. and Dasgupta B.: Fundamentals of Statistics, Vol-II, World Press.
- Cochran, W.G.: Sampling Techniques (3rd Ed.), Wiley Eastern.
- Sukhatme, P.V., Sukhatme, B.V. Sukhatme, S. Asok, C.: Sampling Theories of Survey With Application, IOWA State University Press and Indian Society of Agricultural Statistics.
- Murthy, M.N.: Sampling Theory & Statistical Methods, Statistical Pub. Society, Calcutta.
- Des Raj and Chandhok P.: Sample Survey Theory, Narosa Publishing House.