

### **3<sup>rd</sup> SEMESTER (ELECTIVE AND HONOURS)**

#### **STEh – 3 (TH)**

#### **Categorical data, Survey Sampling and Design of Experiment (Theory)**

**Marks : 75**

**Lectures : 75**

- Unit-I:** Analysis of Categorical Data: Consistency of Categorical data. Independence and association of attributes, various measures of association for two way and three way classified data. **Lectures : 15**
- Unit-II:** Sample Survey: concept of population and sample, comparison of census and sample survey, basic principles in sampling, simple random sampling with and without replacement(SRSWR and SRSWOR), unbiased estimators of population total, mean and their variances, confidence Interval, Estimation of proportion, Methods of selection of sample by SRSWR and SRSWOR determination of sample size. Systematic sampling: variance of the estimated mean, systematic sampling vs simple random sampling. **Lectures : 15**
- Unit-III:** Stratified sampling with SRSWR and SRSWOR within each stratum : estimation of population mean, population total and their variances, proportional allocation, optimum allocation, comparison of stratified sampling with unstratified sampling for SRSWR. Systematic sampling vs stratified random sampling. Estimation of proportion in stratified SRSWR and SRSWOR. **Lectures : 15**
- Unit-IV:** Definition of ANOVA, analysis of variance for one-way and two-way classification with one observation under fixed effect model, fundamental principles of design. **Lectures : 15**
- Unit-V:** Basic designs: CRD, RBD, LSD and their analyses, estimation of one missing observation for RBD and LSD, factorial experiments-  $2^2$ ,  $2^3$ , main effects and interactions. **Lectures : 15**

#### **Text Books:**

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|--|---|---|
| Goon A.M., Gupta, M.K. and Dasgupta, B(1999) | : | Fundamental of Statistics, Vol-I, World Press Kolkata.      |
| Gupta, S. C. and Kapoor, V.K. (2000)         | : | Fundamentals of Mathematical Statistics, S. Chand and Co.   |
| Murthy, M. N. (1967)                         | : | Sampling Theory and Methods Statistical Publishing Society. |

- Sampath, S. (2005) : Sampling Theory and Methods, Alpha Science International
- Goon A. M., Gupta, M.K. and Dasgupta, B(1999) : Fundamental of Statistics, Vol-II, World Press Kolkata.

**Reference :**

- Cochran, W. G. (1977) : Sampling Techniques, John Wiley and Wiley Eastern.
- Sukhatma, P. V., Sukhatme, B. V., : Sampling Theory of Surveys with applications, Asia Publishing House.  
Sukhatme, S and Asok, C (1984).
- Das, M. N. and Giri, N. C. (2006) : Design and Analysis of Experiments, New age international Publishers, New Delhi.
- Mukhopadhyay, P (1998) : Theory and Methods of Survey Sampling

**3<sup>rd</sup> SEMESTER (ELECTIVE AND HONOURS)**

**STEh – 3 (PR)**

**Categorical data, Survey Sampling & Design of Experiments. (Practical)**

- Unit-I:
1. Problems on categorical data for two way and three way classified data: test of independence of attributes.
  2. All possible samples under SRSWR and SRSWOR- verification of results
  3. Selection of sample and determination of sample size by SRSWR and SRSWOR
  5. Estimation of population mean and total and their standard errors and confidence intervals in SRSWR and SRSWOR.
- Unit-II:
5. Estimation of population mean and total and their variances in stratified sampling with SRSWR and SRSWOR.
  6. Proportional and optimum allocation in stratified sampling with SRSWR and SRSWOR.

7. Estimation of population mean and total and their variances in systematic sampling.
8. Variance of sample mean in terms of intraclass correlation coefficient and Efficiency of systematic sampling w.r.t. SRSWR and SRSWOR

- Unit-III:
9. Analysis of variance for one-way classification
  10. Analysis of variance for two-way classification (with one observation per cell).
  11. Analysis of CRD, RBD, LSD.
  12. Estimation of one missing values in CRD, RBD, LSD.
  13. Analysis of  $2^2$  designs,  $2^3$  design.

### Reference :

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|--|---|--|
| Goon A.M., Gupta, M.K. and Dasgupta, B(1999) | : | Fundamental of Statistics, Vol-I, World Press Kolkata.                           |
| Gupta, S.C. and Kapoor, V.K. (2000)          | : | Fundamentals of Mathematical Statistics, S. Chand and Co                         |
| Goon A.M., Gupta, M.K. and Dasgupta, B(1999) | : | Fundamental of Statistics, Vol-II, World Press Kolkata.                          |
| Das, M. N. and Giri, N. G. (2006)            | : | Design and Analysis of Experiments, New age international Publishers, New Delhi. |
| Cochran, W. G. (1977)                        | : | Sampling Techniques, John Wiley and Wiley Eastern.                               |
| Murthy, M. N. (1967)                         | : | Sampling Theory and Methods Statistical Publishing Society.                      |
| Singh, D. and Chaudhary, F.S (1995)          | : | Theory and Analysis of Sample Survey Design,                                     |