Department of Statistics

Syllabus for the Third Semester:

THIRD SEMESTER (Elective and Honours)
STEH - 3 (Theory)
SURVEY SAMPLING and DESIGN of EXPERIMENT

Marks: 75

Duration of Exam.: 3 Hours Lectures: 75

Two questions will be set from each Unit and One question to be answered from each Unit.

UNIT-I

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 Intervals, Estimation of Proportion. Methods of Selection of Sample by SRSWR and SRSWOR, Determination of Sample Size.

Lectures: 15

UNIT – II

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 SRS.

Lectures: 15

UNIT – III

Estimation of Proportion in Stratified SRSWR and SRSWOR. .
Systematic Sampling: Variance of the Estimated Mean, Systematic Sampling versus Srm~le Rand0m sampling. Systematic Sampling vs Stratified Random Sampling. Lectures. 15

UNIT-IV

Analysis of *Variance* for One-Way and Two-Way Classification with one Observation under Fixed Effect Model, Fundamental Principles of Design.
Analysis of Categorical Data: Consistency of Categorical Data. Independence and Association of Attributes, *Various* Measures of Association for Two-Way Classification. Lectures: 15

UNIT-V

Basic Designs: CRD, RBD, LSD with Their Analyses. Estimation of one missing observation for RBD and LSD. Analysis of Factorial Experiments: 2^2 and 2^3 . Lectures: 15

Books

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1999), 'Fundamental of Statistics', *Vol.* I, World Press, Kolkata.
2. Gupta, S. C. & Kapoor, V. K. (2000), 'Fundamentals of Mathematical Statistics', S. Chand and Sons, ND.
3. Murthy, M. N. (1967), 'Sampling Theory and Methods', Statistical Publishing Society.
4. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1999), 'Fundamental of Statistics', *Vol.* 11, World Press, Kolkata.
5. Sampath, S. (2005), 'Sampling Theory and Methods', Alpha science International.
6. Cochran, W. G. {1977), 'Sampling Techniques', John Wiley and Wiley Eastern.
7. Sukhatme, P. *V.,* Sukhatme, B. *V.,* Sukhatme, S. and Asok, C. (1984), 'Sampling Theory of Surveys with Applications', Asia Publishing House.
8. Parimal, M. {2008), 'Theory and Methods of Survey Sampling', Prentice Hall of India.
9. Das, M. N. and Giri, N. C. (2006), 'Design and Analysis of Experiments', New age International Publishers, New Delhi.
10. Singh, D. (2018), 'Theory and Analysis of Sample Survey Design', New age International Publishers, ND.

STEH - 3 (Practical)

SURVEY SAMPLING and DESIGN of EXPERIMENTS

Marks: 25 Duration of Exam: 3 Hours Lectures: 20

Two questions will be set from each Unit and One question to be answered from each Unit.

UNIT -1

1. Problem based on all Possible Samples under SRSWR and SRSWOR - Verification of Results.
2. Problem based on Selection of Sample and Determination of Sample Size by SRSWR and SRSWOR.
3. Problem based on Estimation of Population Mean and Total and Their Standard Errors and Confidence Intervals in SRSWR and SRSWOR.

UNIT-II

4.Problems based on Estimation of Population Mean and Total and Their Variances in Stratified Sampling together with SRSWR and SRSWOR.
5. Problem based on Proportional and Optimum Allocations in Stratified sampling with SRSWR and SRSWOR.
6. Problem based on Estimation of Population Mean and Total and Their Variances in Systematic Sampling.
7. Problem based on Variance of Sample Mean in terms of Intraclass Correlation Coefficient and Efficiency of Systematic sampling w. r. t. SRSWR and SRSWOR.

UNIT-III

8. Problems based on Categorical Data for Two-Way Classified Data: Test of Independence of Attributes.
9. Problem based on Analysis of Variance for one-way classification.
10. Problem based on Analysis of Variance for two-way classification (with one observation per cell).
11. Problem based on analysis of CRD, RBD and LSD.
12. Problem based on Estimation of one missing value in CRD, RBD and LSD.
13. Problem based on Analysis of 22 designs and 23
designs.

Books

1. Agresti, A. (2002), 'Categorical Data Analysis', 2N° Ed., Wiley-lnterscience.
2. Shanmugam, R. (2013), 'Excellent Categorical Data Analysis', Taylor and Francis.
3. Das, M. N. and Giri, N. C. (2006), 'Design and Analysis of Experiments', New age International
4. Singh, D.(2018), 'Theory and Analysis of Sample Survey Design', New age International Publishers,ND.
5. Sampath, S. (2005), 'Sampling Theory and Methods', Alpha science International.
6. Sukhatme, P. *V.,* Sukhatme, B. *V.*, Sukhatme, S. and Asok, C. (1984), 'Sampling Theory of Surveys with Applications', Asia Publishing House.
7. Chaudhuri, A. (2010), 'Essentials of Survey Sampling', Prentice Hall of India.
8. Goon, A. M., Gupta, M. K. and Dasgupta, 8. (1999), 'Fundamental of Statistics', *Vol.* I, World Press, Kolkata.
9. Gupta, S. C. & Kapoor, *V.* K. (2000), 'Fundamentals of Mathematical Statistics', Sultan Chand and Sons, ND.
10. Goon, A. M., Gupta, M. K. and Dasgupta, 8. (1999), 'Fundamental of Statistics', Vol. II, World Press, Kolkata.

Syllabus of 1st Semester:

Syllabus for Major & Minor students:

STA-100: INTRODUCTORY STATISTICS

(Contact Hours: 75, Credits: 4)

Course Objectives: To impart the students a thorough knowledge on the development, meaning and definition of Statistics, various types of data, graphical representation of data, concept of concept of univariate, bivariate and multivariate data, descriptive statistics, correlation, regression, analysis of bivariate data and theory of attributes.

Learning Outcomes: Upon successful completion of this course, the students will understand how the subject Statistics has emerged and developed in analysing data. Students will understand different data types on the ways to represent them. They will get idea of measuring relationship between variables.

UNIT-I: Introduction to Statistics

Historical development of Statistics. Definition and meaning of Statistics. Collection of Data: meaning and need of data, primary and secondary data, scientific methods of collecting primary data,sources of secondary data. Types of data: Qualitative, Quantitative, Cross-Sectional, Time series, Discrete and Continuous,Univariate, bivariate and multivariate data. Scales of Measurement. Presentation of data (Univariate): Classification, tabulation and diagrammatic representation of data.

UNIT-II: Descriptive measures

Descriptive Measures of data- concepts and properties of different measures of central tendency and dispersion (univariate data) and their application in different scales of measurement. Moments; skewness and kurtosis.

UNIT-III: Bivariate Analysis and Theory of Attributes

Tabulation and diagrammatic representation of bivariate data: scatter diagram. Covariance, correlation and its properties. Rank correlation. Regression, Principle of least squares and fitting of Linear regression.
Analysis of Categorical Data: Consistency of Categorical Data. Independence and Associationof Attributes.

UNIT-IV: Practical (30 hours)

Problem on drawing of line, bar, multiple bar, divided bar & pie diagrammes, Problem on drawing of histogram, frequency polygon, frequency curve, ogives. Problem on measures of central tendency. Problem on measures of dispersion. Problem on moments (up to 4^{th} Orders). Problem on coefficients of skewness & kurtosis. Problem on correlation and regression coefficients (for both, grouped & ungrouped data). Problem on fitting of Straight Line. Problem on Spearman's rank correlation coefficient.

Suggested readings:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002): Fundamentals of Statistics, Vol. I& II,8th Edn. The World Press, Kolkata.
2. Gupta, S. C., & Kapoor, V. K. (2002). Fundamental of Mathematical Statistics. Sultan Chand & sons.
3. Mann, Prem S. (2007). Introductory Statistics, 7^{th} Edition. John Wiley & Sons.
4. Medhi, J. (2006). Statistical Methods: An Introductory Text. New Age International (Pvt) Limited, New Delhi.
5. Agarwal, B.L. (2020). Basic Statistics, 6^{th} Edition. New Age International (P) Limited.
6. Ott, R Lyman., Longnecker Michael. (2010). An Introduction to Statistical Methods and Data Analysis, 6^{th} Edition. Cengage Learning.
7. Mood, A.M., Graybill, F.A., Boes, D.C. (2007). Introduction to the Theory of Statistics, 3^{rd} Edition. Tata McGraw-Hill Education Pvt Ltd, Chennai.
8. Miller, Irwin., Miller, Marylees. (2006). John E Freund's Mathematical Statistics with Applications, 8^{th} Edition. Pearson Education India, New Delhi.

Syllabus for the MDC Students:

MDC-110: COMMERCIAL ARITHMETIC AND ELEMENTARY STATISTICS
(Contact Hours-45, Credits-3)

Course Objective: To familiarize the students with the knowledge of essential mathematics and statistics that is applicable in business.

Learning Outcomes: Students will be able to:

a. Acquire the knowledge of various arithmetical and statistical concepts
b. Learn techniques which help in dealing with real-life business situations

UNIT - I

Average- simple and weighted average, Ratio and Proportion. Percentage, Problems on Time and Distance.
Simple interest- Bank interest – Average rate of interest: interest on installment payment Compound Interest (With the help of logarithms)
Annuities- Annuity certain, Annuity due, Immediate Annuity and Deferred Annuity (With the help of logarithms)
Profit and loss, Market price Discount- trade and cash discount

UNIT - II

Bankers discount, true discount, Bill value, Present value, average due date and equation of payment
Stock Exchange investment, transfer of stock and shares, Ex dividend and cum dividend prices Commission and Brokerage
Probability meaning and definition, Events, Trial, Random experiment, mutually likely events, mutually exclusive events, Favorable cases to an event

UNIT - III

Statistics: Meaning, Application and Limitations.
Measures of Central Tendency – Averages (Mean, Median, Mode) and Dispersion (Range, Quartile Deviation and Standard Deviation)
Diagrammatic Presentation of business data (Bar diagram, line diagram, pie and rectangular chart)

Suggested Readings (Latest Edition)

- S.C. Chanda & NK. Nag, Commercial Arithmetic, Kalyani Publication
- Dr. S. K. Singh & Samresh Chauhan, Commercial Arithmetic, SBPD Publication
- Dhayagude M. G., Commercial Arithmetic and Statistics, Everest Publishing House