



St. Xavier's College – Autonomous Mumbai

S.Y.B.A. Syllabus For 3rd Semester Courses in STATISTICS (June 2015 onwards)

Contents:

Theory Syllabus for Courses:

A.STA.3.01 – Statistical Methods (A).

A.STA.3.02 – Operations Research.

Practical Course Syllabus for: A.STA.3. PR

Title: Statistical Methods (A).

Learning Objectives :

To study :

- 1. Concept of probability**
- 2. Probability distribution**

No. of lectures: 45

Unit 1 **(15L)**

Elementary probability theory.

Random Experiment, Sample Point & Sample Space.

Discrete Sample Space, Definition of Event, Elementary Event, Algebra of Events.

Mutually exclusive events, Exhaustive events. Subjective Probability.

Classical, Empirical and Axiomatic definitions of probability.

Conditional Probability, Independence of n Events. ($n = 2, 3$).

Theorems on Addition & Multiplication of Probabilities,

Bayes' Theorem (All theorems with proofs).

Unit 2 **(15L)**

Discrete Random variable:

Univariate :

Random variable. Definition, Properties of Probability Mass Function & Cumulative Distribution Function. Expectation and variance of a random variable. Theorems on Expectation and Variance .

Raw & Central Moments and the relationship between them (without proof).

Concept of Skewness and Kurtosis..

Bivariate :

Joint Probability Mass Function of two Discrete Random Variables, Marginal and Conditional Probability Distributions, Independence of Two Random Variables.

Theorems on Expectation, Variance.

Covariance, Correlation coefficient between two random variables

Unit 3 **(15L)**

Standard Discrete Probability Distributions:

Discrete Uniform distribution, Bernoulli distribution, Binomial Distribution, Poisson Distribution, Hypergeometric Distribution. Derivation of mean, & variance, Calculation of Expected frequencies.

Poisson and Hypergeometric approximation to Binomial Distribution (statement only)

Degenerate distribution.

Topics for Practicals.

1. Probability
2. Discrete Random Variable
3. Bivariate Probability Distributions.
4. Introduce one Practical on R-software on the existing topics.
5. Binomial, Poisson and Hypergeometric Distributions.

List Of Recommended Reference Books

1. Statistical Methods : Welling, Khandeparkar, Pawar, Naralkar Manan Publications. First edition.
2. Statistical Methods : R.J. Shah – Seth Publications. Tenth edition.
3. Basic Statistics : B.L. Agarwal – New Age International Ltd. Fifth edition
4. Theory and Problems of Statistics : Spiegel M.R. – Schaums Publishing Series, Tata McGraw - Hill. First edition
5. Probability and Statistical Inference : Hogg R.V, Tanis E.P. – Macmillan Publishing Co. Inc.
6. Fundamentals of Mathematical Statistics : S. C. Gupta, V.K.Kapoor – Sultan Chand & Sons. Eleventh edition.
7. Statistical Methods : S.P. Gupta – Sultan Chand & Sons. Thirty third edition.
8. Fundamentals of Statistics , Volume II, - Goon A.M., Gupta M.K., Dasgupta B. – The World Press Pvt. Ltd, Calcutta. Fifth edition.
9. Richard. I. Levin, David .S. Rubin: Statistics for Management Fifth edition
10. Prem . S. Mann (2007) . Introductory Statistics (6th edition) John Wiley & Sons.
11. Allan Bluman (2009) Introductory Statistics. A step by step approach (7th edition). McGraw-Hill
12. www.actuaries.org.uk
13. www.actuariesindia.org
14. www.soa.org

Title: Operations Research.

Learning Objectives :

To provide students with an insight into

- 1. The structures and processes that Operations Research can offer and the practical utility of its techniques.**
- 2. Techniques of Operations Research used for scheduling and controlling projects.**

No. of lectures: 45

Unit 1

(15L)

Linear Programming Problem (L.P.P.) :

Definition, Mathematical Formulation. Concepts of Solution, Feasible Solution, Basic Feasible Solution, Optimal solution, , Slack, Surplus & Artificial variable, Standard form, Canonical form

Graphical Method & Simplex Algorithm to obtain the solution to an L.P.P.

Problems involving Unique Solution, Multiple Solution, Unbounded Solution and Infeasible Solution

Unit 2

(15 L)

Transportation Model

Definition, Mathematical Formulation Concepts of Feasible solution, Basic feasible solution Optimal and multiple solution.

Initial Basic Feasible Solution using Vogel's Approximation Method.

MODI Method for optimality.

Problems involving unique solution, multiple solutions, degeneracy, maximization, prohibited route(s) and production costs.

Unbalanced Transportation problems.

Assignment model

Definition, Mathematical formulation. Solution by Hungarian Method.

Unbalanced Assignment problems.

Problems involving Maximization & prohibited assignments.

Unit 3.

(15 L)

Network Analysis

Concept of project as an organized effort with time management.

Objective and Outline of the techniques.

Diagrammatic representation of activities in a project

Gantt Chart and Network Diagram.

Slack time and Float times. Determination of Critical path.

Probability consideration in project scheduling.

Project cost analysis,

Concept of Resource leveling and Resource allocation.

List of Practicals:

1. Linear Programming Problem
2. Transportation Problem
3. Assignment Problem.
4. Network Analysis
5. Introduce a practical for solving LPP using EXCEL / R - Optimization

List Of Recommended Reference Books

1. PERT and CPM, Principles and Applications : Srinath., 2nd edition, East West Press Pvt Ltd
2. Operations Research : Kantiswaroop, P.K.. Gupta and Manmohan Gupta.4th edition , Sultan Chand and Sons
3. Operations Research : S.D. Sharma , 11th edition Kedarnath, Ramnath & Co
4. Operations Research : H.A.Taha , 6th edition , Prentice Hall of India
