Program outcomes, Program Specific Outcomes and Course outcomes

Program Outcome:

Students will be introduced to the various Statistical tools, which are mostly from Descriptive Statistics. This program along with other subjects help students to develop their Mathematical and Analytical Skills. Students will have exposure to the software like R and Microsoft Excel.

Program Specific Outcome:

From Birth to Death Statistics is everywhere in the world. The most discussed jobs in 21st century are from Statistical Fields. In the world of Data Science and Machine Learning, Statistics is very useful. Most of the aptitude tests organised for job interviews contain Statistics questions. So just to have a basic idea about Entry level Statistics, This Program does a great job. Elementary Statistical Techniques those are applicable in research considered in this Program.

Program: FYBA

Course: Statistics: Paper I Semester I (Theory and Practical)

Descriptive Statistics

- 1. To introduce the subject of Statistics to the Students, especially how Statistics is a branch of Mathematics.
- 2. Students will get introduced to Scope and applications of Statistics; Concepts of statistical population and sample; Different types of scales; Types of Data; Verification for consistency, Theory of Attributes. Independence and Association for 2 X 2 tables
- 3. Diagrammatic representation Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution, Stem and leaf diagram and Cumulative frequency polygon. Bivariate frequency distribution. Marginal and Conditional frequency distributions.
- 4. Introduction to Measures of Central Tendencies and Measures of Dispersion.

Program: FYBA

Course: Statistics: Paper I Semester II (Theory and Practical)

- 1. Correlation and regression analysis, Product moment correlation coefficient; Spearman's Rank correlation.
- 2. Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. Relation between regression coefficients and correlation coefficient. Fitting of curves. Concept and use of coefficient determination. Method of least squares. Box-whisker plot.
- 3. Analysis of categorical data, Index numbers as comparative tool; Price Index Numbers; Measures of Simple and Composite Index Numbers; Quantity Index Numbers and Value Index Numbers. Time reversal test, Factor reversal test, Circular test. Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating Cost of Living Index Number. Concept of Real Income based on Wholesale Price Index Number.
- 4. Introduction to Microsoft Excel, Data analysis through Microsoft Excel.

Program: SYBA

Course: Statistics: Paper II Semester III (Theory and Practical)

- 1. Extension to Descriptive Statistics of FYBA
- 2. Introduction to the concept of Elementary Probability Theory; Theorems on Addition and Multiplication of probabilities; Independence of events, Conditional probability, Bayes' theorem and its applications.
- 3. Concept of Discrete random variable and properties of its probability distribution; Properties of probability distribution and cumulative distribution function of discrete random variable; Raw and Central moments and their relationship. (upto order four).
- 4. Concepts of Skewness and Kurtosis and their uses. Expectation of a random variable. Theorems on Expectation and Variance. Joint probability mass function of two discrete random variables. Marginal and conditional distributions. Theorems on Expectation, Variance, Covariance and Coefficient of Correlation. Independence of two random variables.
- 5. Some Standard Discrete Distributions like Discrete Uniform, Binomial, Poisson and Hyper geometric distributions and derivation of their mean and variance; Recurrence relation for probabilities of Binomial and Poisson distributions and its applications; Poisson approximation to Binomial distribution (Statement only).

Program: SYBA

Course: Statistics: Paper III Semester III (Theory and Practical)

- 1. Linear Programming Problem, Concepts of Solution, Feasible Solution, Basic Feasible Solution, Optimal solution, Slack, Surplus & Artificial variable, Standard form, Canonical form.
- 2. Graphical Method & Simplex Algorithm to obtain the solution to an L.P.P.; Problems involving Unique Solution, Multiple Solution, Unbounded Solution and Infeasible Solution; Big M method; Concept of Duality & its economic interpretation.
- 3. Transportation Problem Initial Basic Feasible Solution using (i) North-West Corner rule, (ii) Matrix Minima Method, (iii)Vogel's Approximation Method.
- 4. MODI Method for optimality. Problems involving unique solution, multiple solutions, degeneracy, maximization, prohibited route(s) and production costs. Unbalanced Transportation problem.
- 5. Assignment Problem and sequencing; Hungarian Method; Unbalanced Assignment problems; Travelling salesman problem; Sequencing; Processing n Jobs through 2 and 3 Machines and 2 jobs through m Machines.

Program: SYBA

Course: Statistics: Paper II Semester IV (Theory and Practical)

- 1. Concept of Continuous random variable and properties of its probability distribution; Probability density function and cumulative distribution function, their graphical representation; Expectation of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and central moments (simple illustrations).
- 2. Some continuous distributions like Uniform, Exponential and Normal distribution; Derivations of mean, median and variance for Uniform and Exponential distributions; Properties of Normal distribution and Normal curve; Normal approximation to Binomial and Poisson distribution. Use of normal tables.
- 3. Elementary topics on Estimation and Testing of hypothesis; Concepts of bias and standard error of an estimator; Central Limit theorem; Sampling distribution of sample means and sample proportion; Standard errors of sample mean and sample proportion; Point estimate of single mean, single proportion from sample of large size.
- 4. Statistical tests, Concept of hypothesis, Types of errors, Critical region, Level of significance; Large sample tests (using central limit theorem, if necessary)For testing specified value of population mean For testing specified value in difference of two means and populations proportions

Program: SYBA

Course: Statistics: Paper III Semester IV (Theory and Practical)

- 1. Introduction to Concept of project as an organized effort with time management; CPM and PERT; Diagrammatic representation of activities in a project Gantt Chart and Network Diagram; Slack time and Float times;
- 2. Determination of Critical path. Probability consideration in project scheduling. Project cost analysis.
- 3. GAME THEORY: Two persons Zero Sum Game, Saddle Point, Value of the Game, Pure and Mixed strategy, Optimal solution of two person zero sum games. Dominance property, Graphical solution of (2xn) and (mx2) games.
- 4. DECISION THEORY: Decision making under uncertainty: Laplace criterion, Maximax (Minimin) criterion, Maximin (Minimax) criterion, Hurwitz criterion, Minimax Regret criterion; Decision making under risk: Expected Monetary Value criterion, Expected Opportunity Loss criterion, EPPI, EVPI. Bayesian Decision rule for Posterior analysis. Decision tree analysis along with Posterior probabilities.