ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM

B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: 1	Credits:4
	Descriptive Statistics	Hrs/Wk:4

UNIT I:

Introduction to Statistics: Importance of Statistics. Scope of Statistics in different fields. Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

UNIT Il:

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

UNIT HI:

Curve fitting: Bi- variate data, Principle of least squares, fitting of degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, Fitting of power curve and exponential curves. Correlation: Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems. Concept of multiple and partial correlation coefficients (three variables only) and properties

UNIT IV:

Regression : Concept of Regression, Linear Regression: Regression lines, Regression coefficients and it's properties, Regressions lines for bi-variate data and simple problems. Correlation vs regression.

UNIT-V

Attributes : Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only , Independence of attributes, Association of attributes and its measures, Relationship between association and colligation of attributes, Contingencytable: Square contingency, Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: II	Credits:4
	Probability Ans Probability Distributions	Hrs/Wk:4

UNIT I:

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events.Boole's inequality and Baye's theorem and its applications in real life problems

UNIT II:

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

UNIT IIL:

Mathematical expectation: Mathematical expectation of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: III	Credits:4
	Statistical Inference	Hrs/Wk:4

UNIT I:

Concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error, convergence in probability and convergence in distribution, law of large numbers, central limit theorem (statements only). Student's t- distribution, F
- Distribution, &-Distribution: Definitions, properties and their
applications.

UNIT II:

Theory of estimation: Estimation of a parameter, criteria of a good estimator - unbiasedness, consistency, efficiency, &sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Binomial. Poison &Normal Population parameters estimate by MLE method. Confidence Intervals.

UNIT II:

Testing of Hypothesis: Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman-Pearson's lemma. Examples in case of Binomial, Poison, Exponential and Normal distributions.

UNIT IV:

Large sample Tests: large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. standard deviation(s) and correlation coefficient(s).
Small Sample tests: t-testforsinglemean,differenceofmeansandpairedt-test.y2-testforgoodness of fitand independence of attributes. F-test for equality of variances.

UNIT V:

Non-parametric tests- their advantages and disadvantages, comparison with parametric tests. Measurement scale- nominal, ordinal, interval and ratio. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test. Wilcoxon Mann-Whitney U test, Wald Wolfowitz's runs test.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: IV	Credits:4
	Probability Ans Probability Distributions	Hrs/Wk:4

UNIT I:

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events.Boole's inequality and Baye's theorem and its applications in real life problems

UNIT II:

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

UNIT III:

Mathematical expectation: Mathematical expectation of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: IV	Credits:4
	SAMPLING TECHNIOUES AND DESIGN OF EXPERIMENTS	Hrs/Wk:4

UNIT I:

Simple Random Sampling (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimates of population total, mean and their variances and standard errors, determination of sample size, simple random sampling of attributes.

UNIT II:

Stratified random sampling: Stratified random sampling, Advantages and Disadvantages of Stratified Random sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

Systematic sampling: Systematic sampling definition when N = nk and merits and demerits of systematic sampling

- estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR.

UNIT III:

Analysis of variance : Analysis of variance(ANOVA) -Definition and assumptions. One-way with equal and unequal classification, Two way classification.

Design of Experiments: Definition, Principles of design of experiments, CRD; Layout, advantages and disadvantage and Statistical analysis of Completely Randomized Design(C.R.D).

UNIT IV:

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, MissingplottechniqueinRBDandLSD.EfficiencyRBDoverCRD,EfficiencyofLSDoverRBDandCRD.

UNIT V:

Factorial experiments -

Main effects and interaction effects of 22 and 23 factorial experiments and theirStatistical analysis. Yates procedure to find factorial effect totals.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: IV	Credits:4
	Applied Statistics	Hrs/Wk:4

UNIT I:

Time Series: Time Series and its components with illustrations, additive, multiplicativemodels. Trend: Estimation of trend by free hand curve method, method of semi averages.Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

UNIT II:

Seasonal Component: Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods, Depersonalization.

UNIT II:

Growth curves: Modified exponential curve, Logistic curve and Grompertz curve, fitting of growth curves by the method of three selected points and partial sums.Detrending. Effect of elimination of trend on other components of the time series

UNIT IV:

Index numbers: Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspayer's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers.

Cost of living index

number and wholesale price index number.

UNIT V:

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics. easures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: V (Skil Enhacement Course - Elective)	Credits:4
	Operations Reserch - I	Hrs/Wk:4

Syllabus

UNIT I:

Introduction of OR - Origin and development of OR - Nature and features of OR -Scientific Method in OR -Modeling in OR - Advantages and limitations of Models-General Solution methods of OR models Applications of Operation Research. Linear programming problem (PP) - Mathematical formulation of the problem - illustrations on Mathematical formulation of Linear programming of problem. Graphical solution of linear programming problems. Some exceptional cases - Alternative solutions, Unbounded solutions, non-existing feasible solutions by Graphical method.

UNIT II:

General linear programming Problem (GLP) - Definition
and Matrix form of GLP problem, Slack
variable, Surplus variable, unrestricted Variable, Standard form of LP and Canonical form of LPP Definitions of Solution, Basic Solution, Degenerate Solution, Basic feasible Solution and Optimum Basic Feasible Solution. Introduction to Simplex method and Computational procedure of simplex algorithm Solving LPP by Simplex method (Maximization case and Minimization case)

UNIT III:

Artificial variable technique - Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solution, Unbounded solution, Non existing feasible solution and Solution of simultaneous equations by Simplex method.

UNIT IV:

Duality in Linear Programming -Concept of duality - Definition of Primal and Dual Problems, General rules for converting any primal into its Dual, Economic interpretation of duality, Relation between the solution of Primal and Dual problem (statements only). Using duality to solve primal problem.Dual Simplex Method.

UNIT V:

Post Optimal Analysis - Changes in cost Vector C, Changes in the Requirement Vector b and changes in the Coefficient Matrix A. Structural Changes in a LPP.

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B.Sc Statistics Syllabus (w.e.f:2020-21 A.Y)

	Semester: V (Skil Enhacement Course - Elective)	Credits:4
	Operations Reserch - II	Hrs/Wk:4

UNIT I:

Transportation Problem - Introduction, Mathematical formulation of Transportation problem. Initial Basic feasible solution of Transportation problem - North-West corner rule, Lowest cost entry method, Vogel's approximation method. Method of finding optimal solution-MODI method(-V method). Degeneracy in transportation problem, Resolution of degeneracy, Unbalanced transportation problem. Maximization TP.Transhipment Problem.

UNIT II:

Assignment Problem - Introduction, Mathematical formulation of Assignment problem, Reduction theorem (statement only), Hungarian Method for solving Assignment problem, Unbalanced Assignment problem. The Traveling salesman problem, Formulation of Traveling salesman problem as an Assignment problem and Solution procedure.

UNIT II:

Sequencing problem: Introduction and assumptions of sequencing problem, Sequencing of n jobs and one machine problem. Johnson's algorithm for n jobs and two machines problem- problems with n jobs on two machines, algorithm for n jobs on three machines problem- problems with n- jobs on three machines, algorithm for n jobs on m machines problem, problems with n-jobs on m-machines.

UNIT IV:

Network Scheduling: Basic Components of a network, nodes and ares, events and activities- Rules of Network construction - Time calculations in networks - Critical Path Method (PM) and PERT.

UNIT V:

Game Theory: Two- person zero-sum games. Pure and Mixed strategies. Maxmin and Minimax Principles - Saddle point and its existence. Games without Saddle point-Mixed strategies.Solution of 2 × 2 rectangular games. Graphical method of solving 2 x n and m x 2 games. Dominance Property.