BACHELORS WITH STATISTICS AS MAJOR

7th SEMESTER (Hon's)

Course Code: STS722J1 **Course Title: Sampling Techniques-I**

Theory: 3 Credits **Practical: 1 Credit**

Course Objectives: To introduce concepts of sampling theory.

Course Learning outcomes: Students who successfully complete this course will be able to:

- Formulate and calculate estimators of population mean, population ratio, population total for Systematic and cluster sampling.
- Estimate the convenient sample size under different sampling strategies.
- Compare various sampling procedures in terms of variance of estimators.
- Handle the practical uses of arising in sampling studies.

UNIT I

Systematic Sampling: types of systematic sampling, Advantages and disadvantages of systematic sampling. Applications of systematic sampling. Sample mean and its variances. Comparison of systematic with simple random and stratified sampling in the general case and also in the case of linear trend.

UNIT II

Cluster sampling: Estimation of mean and its variance for equal and unequal clusters. Efficiency in terms of intra-class correlation. Optimum unit of sampling. Sampling with replacement and unequal probabilities. Estimation of mean and its variance.

UNIT III

Ratio and Regression methods of Estimation: Variance of the estimates, estimation of variances, optimum property of ratio and regression estimator. Ratio and regression estimator in stratified random sampling. Comparison among regression, ratio and simple unbiased estimates. Unbiased ratio type estimates.

PRACTICAL: 01 CREDIT **(PREFERABLY THROUGH COMPUTERS)**

Practical based on:

1. Estimation of mean and variance and mean square error under Systematic Sampling and Cluster Sampling in real life data sets.
2. Estimation of mean and variance and mean square error of Ratio and Regression estimators in real life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Cochran, W. G: Sampling Techniques, 3rd edition, Wiley.

II. Mukhopadhyay, P. (2000): Theory and Methods of Survey Sampling,Prentice Hall of India, Private limited, New Delhi

III. Des Raj &Chandak(1998): Sampling Theory, Narosa.

IV. Murthy, M. N. (1977): Sampling Theory and Methods, Statistical Publishing Society,Calcutta.

V. Skate teal (1984): Sampling Theory of Surveys with Applications, Iowa State University Press, & IARS.

VI. Singh, D and Chuddar, F. S. (1986): Theory and Analysis of Sample Survey Design.

VII. Sirjendar Singh (2022): Advanced Sampling Theory with Applications; Springer Publishing House.

BACHELORS WITH STATISTICS AS MAJOR
7th SEMESTER (Hon's)

Course Code: STS722J2 **Course Title: Advanced Probability Theory**
Theory :4 Credits **Practical: 2 Credits**

Course objectives: To Introduce the advanced concepts of probability theory.
Course Learning outcomes: On successful completion of this course, the students will be able to

- Describe the advanced techniques of Probability theory.
- Apply the results of advanced Probability in statistical theory.

UNIT-I

Fisher's Z-distribution, Fisher's Z transformation with properties and applications. Sampling distributions: Student's t distribution, Fisher's t distribution, derivation, properties and applications. Mean and variance through moment generating function, Relation of z & t distribution with the other distributions. Non-central t-distribution: assumptions, properties and applications.

UNIT-II

Sampling distributions: Chi-square distribution: derivation, constants, conditions, yates' correction, grouping when individual frequency are small, properties and applications. Mean and variance through moment generating function, Limiting case and additive property of chi-square distribution. Relation of Chi-square distribution with the other related distributions. Non-central Chi-square distribution; assumptions, properties and applications.

UNIT-III

F distribution: Introduction, derivation, constants, mode, point of inflexion, properties and applications. Relation of F distribution with the t and Chi-square distributions. Non-central F-distribution: assumptions, properties and applications.

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UNIT-IV

Bivariate distributions: Bivariate normal distribution and multinomial distributions and their properties, marginal and conditional distributions. Expectations and conditional expectations, covariance with examples.

PRACTICAL: 02 CREDITS (PREFERABLY THROUGH COMPUTERS)

Practical's based on:

1. Tests based on Chi-Square Distribution:
    a. To test if the population variance has a specific value and its confidence intervals.
    b. To test the goodness of fit.
    c. To test the independence of attributes.
    d. Test based on 2 x 2 contingency table.
2. Tests based on t- Distribution and F- Distribution:
    a. Testing of significance and confidence intervals for single mean and difference of two means and paired t – test.
    b. Testing and confidence intervals of equality of two population variances.
3. Tests based on Z transformation and Fisher's Z distribution.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Dudewicz, E.J. and Mishra, S.N. (1988): Modern Mathematical Statistics, Willy, Int'l Students edition
II. Rohatgi, V.K. (1994): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
III. Rao, R.C. (1973): Linear Statistical Inference and its Applications, 2/e, Wiley Eastern
IV. Ash, Robert. (1972): Real Analysis and Probability, Academic Process
V. Dudley, R.M. (1989): Real Analysis and Probability, Wads worth and Brooks /Cole
VI. Pitman, J. (1993): Probability, Narosa Publishing House.
VII. Johnson, S.andKotz, (1972): Distributions in Statistics, vol. III, Houghton and I, II And Miffin.
VIII. Johnson, Kotz and Kemp (1992): Univariate discrete distribution, John Willy.
IX. S C Gupta (2016):Fundamental of Mathematical Statistics: S Chand and Sons.

BACHELORS WITH STATISTICS AS MAJOR
7th SEMESTER (Hon's)

Course Code: STS722J3 Course Title: Mathematical Methods

Theory: 04 Credits Tutorial :02 Credits

Course Objectives: To introduce the concepts of linear algebra and Real Analysis.

Course Learning outcomes: On successful completion of this course, the students will be able to:

- the study of matrices, Linear function and their representations through the survey of matrices and vector spaces.
- make students aware of representing statistical data in the matrix forms and then analyzing in terms of linear algebraic tools and techniques.
- study the behavior and properties of Real numbers, Sequence and Series of real numbers and real valued functions in order to tackle daily life problems arising from physical phenomenon.

UNIT-I

Algebra of Matrices, trace of a matrix, tr(AB)= tr(BA), types of matrices: symmetric, skew symmetric, Hermitian, Skew-Hermitian, idempotent, nilpotent, orthogonal and Unitary matrices. Inverse of square matrix, Inverse of partitioned matrices. Rank of matrix, characteristic and minimal equation, Cayley-Hamilton Theorem and its Applications. Eigen values and Eigen vectors.

UNIT-II

Linear equations, solution of homogenous and non-homogenous equations. Vector spaces, basis and Dimensions. Linear Transformations and their matrix representation. Inner product spaces, orthogonal and orthonormal basis. Quadratic forms, reduction and classification of quadratic forms.

UNIT-III

Finite, countable and uncountable sets, bounded and unbounded sets, Archimedean property, ordered field, completeness of R, sequence and series, limit supremum and limit infimum of a bounded sequence. Convergence and divergence of positive term series, comparison, root and ratio tests for the convergence of series. Cauchy-Schwarz Inequality, Chebyshev's Inequality, Central limit theorem.

UNIT-IV

Limit, Continuity, uniform continuity of functions of one variable, the algebra of continuous functions, monotonic functions, types of discontinuities, infinite limits and limits at infinity. Differentiability, Rolle's Theorem, Mean Value Theorems, Riemann sum and integral (simple problems). Functions of several variables. Limit and continuity of functions of several variables.

TUTORIAL: 02 CREDITS

Tutorial based on:

1. Cayley-Hamilton Theorem, solution of homogenous and non-homogenous linear equations.
2. Central limit theorem, Rolle's Theorem and Mean Value Theorems.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Grabill, Walter(1976). Matrices with Applications in Statistics, 2nd Ed.Wadsworth.
II. Roa,C.R.(1973), Linear Statistical Inference and its Applications, 2nd Ed.John Wileyand Sons,Inc.
III. Searel, S.R.(1982).Matrix Algebra useful for Statistics. John Wiely and Sons,Inc.
IV. Aziz, A, Rather, N.A. and Zargar, B.A.: Elementary Matrix Algebra, KBD(Kashmir Book Depo)
V. Shanti Narayan, A text book of matrices, Narosa Publ. linear independence and linear dependence of row (column) vectors.
VI. Apostol, T.M (1985), Mathematical Analysis, Narosa, India Ed.
VII. Courant, R.and John, F.(1965), Introduction to Calculus and Analysis, Wiley. S.C.Malik, Mathematical Analysis, New Age International Limited.
VIII. Miller, K.S(1975)Advanced Real Calculus, Harper, New York.
IX. Rudin, Walter(1976). Principles of Mathematical Ananlysis, McGraw Hill.

BACHELORS WITH STATISTICS AS MAJOR

7th SEMESTER (Hon's)

Course Code: STS722N **Course Title: Sampling Techniques-I**

Theory :3 Credits **Practical: 1 Credit**

Course Objectives: To introduce concepts of sampling theory.

Course Learning outcomes: Students who successfully complete this course will be able to:

- Formulate and calculate estimators of population mean, population ratio, population total for Systematic and cluster sampling.
- Estimate the convenient sample size under different sampling strategies.
- Compare various sampling procedures in terms of variance of estimators.
- Handle the practical uses of arising in sampling studies.

UNIT I

Systematic Sampling: types of systematic sampling, Advantages and disadvantages of systematic sampling. Applications of systematic sampling. Sample mean and its variances. Comparison of systematic with simple random and stratified sampling in the general case and also in the case of linear trend.

UNIT II

Cluster sampling: Estimation of mean and its variance for equal and unequal clusters. Efficiency in terms of intra-class correlation. Optimum unit of sampling. Sampling with replacement and unequal probabilities. Estimation of mean and its variance.

UNIT III

Ratio and Regression methods of Estimation: Variance of the estimates, estimation of variances, optimum property of ratio and regression estimator. Ratio and regression estimator in stratified random sampling. Comparison among regression, ratio and simple unbiased estimates. Unbiased ratio type estimates.

PRACTICAL: 01 CREDIT **(PREFERABLY THROUGH COMPUTERS)**

Practical based on:

1. Estimation of mean and variance and mean square error under Systematic Sampling and Cluster Sampling in real life data sets.
2. Estimation of mean and variance and mean square error of Ratio and Regression estimators in real life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Cochran, W. G: Sampling Techniques, 3rd edition, Wiley.
II. Mukhopadhyay, P. (2000): Theory and Methods of Survey Sampling,Prentice Hall of India, Private limited, New Delhi
III. Des Raj &Chandak(1998): Sampling Theory, Narosa.
IV. Murthy, M. N. (1977): Sampling Theory and Methods, Statistical Publishing Society,Calcutta.
V. Skate teal (1984): Sampling Theory of Surveys with Applications, Iowa State University Press, & IARS.
VI. Singh, D and Chuddar, F. S. (1986): Theory and Analysis of Sample Survey Design.
VII. Sirjendar Singh (2022): Advanced Sampling Theory with Applications; Springer Publishing House.

BACHELORS WITH STATISTICS AS MAJOR (Hon's)
8th SEMESTER

Course Code: STS822J1

Course Title: Statistics with R

Theory: 03 Credits **Practical :01 Credit**

Course objectives: This Course is developed to help the students to learn various advanced techniques of data analysis in R Software.

Course Learning outcomes: After successful completion of this course, the students will be able to:

- Have full knowledge of R software.
- Find solutions of problems of optimization through R.
- Articulate statistical modelling using R.
- Apply these modelling tools in Statistical learning.

UNIT-I

Introduction to R language, R as a calculator, Vectorization, notation and naming. Creation ofdata object, vector, factor and data frame. Extraction operators in R, data import/export, manipulation of data, Summary of data and statistical graphics with R. Representation of Multivariate data in R. Managing matrices in R: creating matrices, adding on to matrices, adding attributes to matrices, sub-setting matrices.

UNIT-II

Correlation and Regression analysis in R: simple and multiple. Tests of significance, Test of single proportion, Test of significance of difference of proportions. Chi-Square tests in R, Chi-Square goodness of fit tests, Chi-Square tests of independence of attributes, inference about population variance homogeneity of independent estimates of the population variance.

UNIT-III

Using R Software's: t-test for single mean, difference of means and paired t-test. Test for correlation in sampling from normal population, F-test, testing of two variances of two univariate normal population.

Simulation Studies using R Software, random number generation of various probability distributions. Codes for different programmes in R-Software.

PRACTICAL: 01 CREDIT

Practical based on:

1. Descriptive statistics, data manipulation functions and operation of matrices for simulated and real-life data sets.
2. Correlation and Regression analysis, test of significances using Z, t, F and chi-square tests for simulated and real-life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Bradley C. Boehmke (2016): Data Wrangling with R. Springer.
II. E.J. Dudewicz and S.N. Mishra. (1988): Modern Mathematical Statistics, Willy,Int'l Students edition.
III. John Verzani. (2005): Using R for Introductory Statistics. Chapman & Hall/CRC.
IV. S.C. Gupta and V.K. Kapoor (2012): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
V. Michael J.Crawley (2007): The R book: Wiley.

BACHELORS WITH STATISTICS AS MAJOR (Hon's)
8th SEMESTER

Course Code: STS822J2

Course Title: Linear Models and Regression Analysis

Theory: 04 Credits **Practical: 02 credits**

Course objectives: To introduce basic and advance concepts of general linear model.
Course Learning outcomes: On successful completion of this course, the students will be able to:

- Describe the concepts of linear models in real applications of statistics modelling.
- Apply concepts of linear models to illustrate its application areas like design of experiments, econometrics, survival analysis and demography.

UNIT-I

Linear models; Gauss Markov set up, Model classification, Normal equations and least squares estimates, Error and estimation space, Variance and covariance of least square estimates, Estimation of error variance, estimation with correlated observations, least square estimates with restriction on parameters.

UNIT-II

Test of hypotheses for one and more than one linear parametric functions, Tests of linear hypotheses, estimable linear hypotheses, confidence intervals and prediction intervals, Generalized F test, generalized t test.

UNIT-III

Experimental Design models; Introduction, point estimation, Re-parameterization, Variance and Covariance of estimable function, testing of hypotheses, Regression models.

UNIT-1V

Simple linear and multiple regression fit of polynomials, Residual and their plot as tests for departure from assumption such as fitness of model, normality, and homogeneity of variances and detectionof outliers, Analysis of covariance, estimation and testing, o n e way model with one covariance, two-way model with two covariance.

PRACTICAL: 02 CREDITS (PREFERABLY THROUGH COMPUTERS)

Practical based on:

1. Least square estimators in linear models for real life data sets.
2. generalized F test and t test in linear models for real life data sets.
3. Simple linear regression and multiple linear Regression for real life data sets.
4. Experimental design models for real life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Cookers.and Weisberg, S (1982). Residual and Influence in Regression. Chapman and Hall
II. Draper,N.R. and Smith, R.L. (1998). Applied Regression Analysis.3rd Ed. Wiley.
III. Gunst, R.F. and Mason, R.L. (1980). Regression Analysis and its Applications- A Data Oriented Approach. Marcel and Decker.
IV. Roa, C.R. (1973). Linear Statistical Inference and its Applications. Wiley Eastern.
V. Weisberg, S. (1985). Applied Linear Regression.Wiley.
VI. Rencher,A.C And Schaalje,G.B(2007),Linear Model in Statistics, John Wiely and Sons
VII. Graybill, Franklin A (1961): An introduction to linear statistical models, New York : McGraw-Hill

BACHELORS WITH STATISTICS AS MAJOR
8th SEMESTER (Hon's)

Course Code: STS822J3 Course Title: Operations Research - II
Theory: 04 Credits Practical:02 credits

Course objectives: To introduce the basic and advanced concepts of Operations Research

Course Learning outcomes: After successful completion of this course, the students will be able to:

- Formulate the LPP of the industrial problems.
- Describe the technique of Operations Research.
- Apply the Operation Research game theory and project networking in decision making.
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UNIT I

Review of Linear programming problems (LPP). Methods of solving LPP: Two-phase method and Extreme point theorems; Revised Simplex Method, Assignment Problems: balanced and unbalanced Assignment Problems, Hungarian method.

UNIT II

Duality in Linear programming problem, Symmetric and asymmetric dual problems, Unrestricted variables in dual LPP. Relationship between Primal and Dual LPP. Duality theorems: Weak duality theorem, Optimality criterion theorem, Unboundedness theorem, Fundamental theorem of duality, Complementary Slackness theorem and Complementary Slackness conditions and their applications. Dual Simplex Method.

UNIT III

Introduction to game theory. Strategy and its types. Decision Making in the face of competition, payoff matrix , two–person zero sum games,. Maximin and Minimax principle. Games with pure and mixed strategies, existence of solution and uniqueness of value in zero-sum games, finding solutions of 2x2 payoff matrices. Dominance principle, finding solutions of 2 x m and mx2 type games, Equivalence between game theory and linear programming problem.

UNIT IV

Sequencing and scheduling problems: 2 machine n-job; 3 machine n-job problems with identical machine sequence for all jobs; 2-job n-machine problem with different routings. Project management; PERT and CPM; rules of network construction, determination of ES and EF times, determination of LS and LF times, determination of float. Probability of project completion. Project Crashing.

PRACTICAL: 02 CREDITS

Practical's based on:

1. LPP's using Two phase, Revised Simplex Method and dual simplex method for case studies.
2. Game theory by using Graphical solution to mx2 / 2xn rectangular game and Mixed strategy for case studies.
3. project networking problems through CPM and PERT for case studies.
4. Sequencing and scheduling problems using 2 machines n jobs, 3 machines n jobs and 2 jobs and n machines for case studies.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Taha H.A. (1982) Operational Research: An introduction; Macmillan.

II. Philips D.T., Ravindran A. and Solberg J. Operation Research, Principles and Practice.

III. Kanti Swarup, P.K. and Singh,M.M.. (1985) Operation Research; Sultan Chand & Sons.

IV. Hillier F.S. and Lieberman G.J. (1962) Introduction to Operation Research; HoldenDay.

V. Churchman C.W, Ackoff R.L. and Arnoff E.L. (1957) Introduction to Operations Research

VI. R. Panneerselvam(2002): Operations Research: Prentice Hall

VII. S D Shrama (2014): Operations Research (Theory Methods & Applications)

BACHELORS WITH STATISTICS AS MAJOR (Hon's)
8th SEMESTER

Course Code: STS822N

Course Title: Statistics with R

Theory: 03 Credits **Practical :01 Credit**

Course objectives: This Course is developed to help the students to learn various advanced techniques of data analysis in R Software.

Course Learning outcomes: After successful completion of this course, the students will be able to:

- Have full knowledge of R software.
- Find solutions of problems of optimization through R.
- Articulate statistical modelling using R.
- Apply these modelling tools in Statistical learning.

UNIT-I

Introduction to R language, R as a calculator, Vectorization, notation and naming. Creation ofdata object, vector, factor and data frame. Extraction operators in R, data import/export, manipulation of data, Summary of data and statistical graphics with R. Representation of Multivariate data in R. Managing matrices in R: creating matrices, adding on to matrices, adding attributes to matrices, sub-setting matrices.

UNIT-II

Correlation and Regression analysis in R: simple and multiple. Tests of significance, Test of single proportion, Test of significance of difference of proportions. Chi-Square tests in R, Chi-Square goodness of fit tests, Chi-Square tests of independence of attributes, inference about population variance homogeneity of independent estimates of the population variance.

UNIT-III

Using R Software's: t-test for single mean, difference of means and paired t-test. Test for correlation in sampling from normal population, F-test, testing of two variances of two univariate normal population.

Simulation Studies using R Software, random number generation of various probability distributions. Codes for different programmes in R-Software.

PRACTICAL: 01 CREDIT

Practical based on:

1. Descriptive statistics, data manipulation functions and operation of matrices for simulated and real-life data sets.
2. Correlation and Regression analysis, test of significances using Z, t, F and chi-square tests for simulated and real-life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Bradley C. Boehmke (2016): Data Wrangling with R. Springer.
II. E.J. Dudewicz and S.N. Mishra. (1988): Modern Mathematical Statistics, Willy, Int'l Students edition.
III. John Verzani. (2005): Using R for Introductory Statistics. Chapman & Hall/CRC.
IV. S.C. Gupta and V.K. Kapoor (2012): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
V. Michael J.Crawley (2007): The R book: Wiley.

BACHELORS WITH STATISTICS AS MAJOR with Research
8th SEMESTER

Course Code: STS822J1

Course Title: Statistics with R

Theory: 03 Credits **Practical :01 Credit**

Course objectives: This Course is developed to help the students to learn various advanced techniques of data analysis in R Software.

Course learning outcomes: After successful completion of this course, the students will be able to:

- Have full knowledge of R software.
- Find solutions of problems of optimization through R.
- Articulate statistical modelling using R.
- Apply these modelling tools in Statistical learning.

UNIT-I

Introduction to R language, R as a calculator, Vectorization, notation and naming. Creation ofdata object, vector, factor and data frame. Extraction operators in R, data import/export, manipulation of data, Summary of data and statistical graphics with R. Representation of Multivariate data in R. Managing matrices in R: creating matrices, adding on to matrices, adding attributes to matrices, sub-setting matrices.

UNIT-II

Correlation and Regression analysis in R: simple and multiple. Tests of significance, Test of single proportion, Test of significance of difference of proportions. Chi-Square tests in R, Chi-Square goodness of fit tests, Chi-Square tests of independence of attributes, inference about population variance homogeneity of independent estimates of the population variance.

UNIT-III

Using R Software's: t-test for single mean, difference of means and paired t-test. Test for correlation in sampling from normal population, F-test, testing of two variances of two univariate normal population.

Simulation Studies using R Software, random number generation of various probability distributions. Codes for different programmes in R-Software.

PRACTICAL: 01 CREDIT

Practical based on:

1. Descriptive statistics, data manipulation functions and operation of matrices for simulated and real-life data sets.
2. Correlation and Regression analysis, test of significances using Z, t, F and chi-square tests for simulated and real-life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Bradley C. Boehmke (2016): Data Wrangling with R. Springer.

II. E.J. Dudewicz and S.N. Mishra. (1988): Modern Mathematical Statistics, Willy, Int'l Students edition.

III. John Verzani. (2005): Using R for Introductory Statistics. Chapman & Hall/CRC.

IV. S.C. Gupta and V.K. Kapoor (2012): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.

V. Michael J.Crawley (2007): The R book: Wiley.

BACHELORS WITH STATISTICS AS MAJOR with Research
8th SEMESTER

Course Code: STS822P

Course Title: Research Project / Dissertation

Practical: 12 Credits

Note: The Project work will be based on Research Methodology followed by analyzing the real-life problems using statistical Techniques.

BACHELORS WITH STATISTICS AS
MAJOR with Research
8th SEMESTER

Course Code: STS822N

Course Title: Statistics with R

Theory: 03 Credits **Practical :01 Credit**

Course objectives: This Course is developed to help the students to learn various advanced techniques of data analysis in R Software.

Course learning outcomes: After successful completion of this course, the students will be able to:

- Have full knowledge of R software.
- Find solutions of problems of optimization through R.
- Articulate statistical modelling using R.
- Apply these modelling tools in Statistical learning.

UNIT-I

Introduction to R language, R as a calculator, Vectorization, notation and naming. Creation ofdata object, vector, factor and data frame. Extraction operators in R, data import/export, manipulation of data, Summary of data and statistical graphics with R. Representation of Multivariate data in R. Managing matrices in R: creating matrices, adding on to matrices, adding attributes to matrices, sub-setting matrices.

UNIT-II

Correlation and Regression analysis in R: simple and multiple. Tests of significance, Test of single proportion, Test of significance of difference of proportions. Chi-Square tests in R, Chi-Square goodness of fit tests, Chi-Square tests of independence of attributes, inference about population variance homogeneity of independent estimates of the population variance.

UNIT-III

Using R Software's: t-test for single mean, difference of means and paired t-test. Test for correlation in sampling from normal population, F-test, testing of two variances of two univariate normal population.

Simulation Studies using R Software, random number generation of various probability distributions. Codes for different programmes in R-Software.

PRACTICAL: 01 CREDIT

Practical based on:

1. Descriptive statistics, data manipulation functions and operation of matrices for simulated and real-life data sets.
2. Correlation and Regression analysis, test of significances using Z, t, F and chi-square tests for simulated and real-life data sets.

RECOMMENDED TEXT BOOKS & REFERENCES:

I. Bradley C. Boehmke (2016): Data Wrangling with R. Springer.

II. E.J. Dudewicz and S.N. Mishra. (1988): Modern Mathematical Statistics, Willy, Int'l Students edition.

III. John Verzani. (2005): Using R for Introductory Statistics. Chapman & Hall/CRC.

IV. S.C. Gupta and V.K. Kapoor (2012): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.

V. Michael J.Crawley (2007): The R book: Wiley.