DEPARTMENT OF MATHEMATICS & STATISTICS

VEERANARI CHAKALI ILAMMA WOMEN'S UNIVERSITY

Koti, Hyderabad – 500095

B.A/B.Sc. II Year III Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - III)

Paper – III : Statistical Methods and Theory of Estimation

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Objectives: To enable the students to learn the concepts population, sample, Sampling distribution, Standard error, Parameter, Estimator and properties of estimators. To make the students know about correlation and Regression, Correlation ratio, multiple and Partial correlations and their applications.

Outcomes: After the completion of the course students will be able to apply the statistical tools wherever necessary

Unit –I

Bivariate data, Scattered diagram, Principle of least squares, fitting of straight line, quadratic and power curves. Concept of correlation, computation of Karl-Pearson correlation coefficient for grouped and ungrouped data and its properties.

Correlation ratio, Spearman's rank correlation coefficient and its properties. Simple linear regression, correlation verses regression, properties of regression coefficients.

Unit –II

Concepts of partial and multiple correlation coefficients (only for three variables). Analysis of categorical data, their independence, Association and partial association of attributes. Various measures of association: (Yule's) for two way data and coefficient of contingency (Pearson and Tcherprow) and coefficient of colligation**.**

Unit – III

Concepts of Population, Parameter, Random sample, Statistic, Sampling distribution and Standard error. Standard error of sample mean(s) and sample proportion(s). Exact sampling distributions - Statement and properties of χ^2, t and F distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.

Point estimation of a parameter, concept of bias and mean square error of an estimate. Criteria of a good estimator- consistency, unbiasedness, efficiency and sufficiency with examples.

Unit – IV

Statement of Neyman's Factorization theorem, derivations of sufficient statistics in case of Binomial, Poisson, Normal and Exponential (one parameter only) distributions. Estimation by the method of moments, Maximum likelihood estimation (MLE), statements of asymptotic properties of MLE. Concept of interval estimation. Confidence intervals of the parameters of normal population by Pivot method.

Reference Books:

1. Goon AM, Gupta MK, Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt. Ltd., Kolkata.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi

Additional References:

1. Hoel P.G : Introduction to Mathematical statistics, Asia Publishing house.
2. Sanjay Arora and Bansilal :.New Mathematical Statistics Satya Prakashan , New Delhi
3. Hogg and Craig : Introduction to Mathematical statistics. Prentice Hall
4. Siegal, S., and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
5. Gibbons J.D and Subhabrata Chakraborti : Nonparametric Statistical Inference. Marcel Dekker.
6. Parimal Mukhopadhyay : Mathematical Statistics. New Central Book agency.
7. Conover : Practical Nonparametric Statistics. Wiley series.
8. V. K. Rohatgi and A. K. Md. Ehsanes Saleh : An introduction to probability and statistics, Wiley series.
9. Mood A M, Graybill F A, Boe's DC. Introduction to theory of statistics. TMH
10. Paramiteya Mariyu Aparameteya Parikshalu. Telugu Academy.
11. K.V. S. Sarma: Statistics made simple do it yourself on PC. PHI
12. Gerald Keller : Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
13. Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th Edition, Pearson Publication.
14. Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
15. Milton and Arnold (fourth Edition):Introduction to Probability and Statistics, Tata McGraw Hill Publication.

DEPARTMENT OF MATHEMATICS & STATISTICS

TELANGANA MAHILA VISWAVIDYALAYAM

(Autonomous) Koti, Hyderabad – 500095

B.A/B.Sc. II Year III Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - III)

Practical – *3 : Statistical Methods and Theory of Estimation*

(2 HPW, Credits 1 and Marks 50)

Part – A (Using Calculator)

1. Generation of random samples from Uniform (0,1), Uniform (a,b), Normal and Poisson and Exponential Distributions.
2. Fitting of straight line and parabola by the method of least squares.
3. Fitting of power curves of the type $y= a x^b$, $y=a b^x$ and $y=a e^{bx}$ by the method of least squares.
4. Computation of Yule's coefficient of association and Pearson's, Tcherprows coefficient of contingency.
5. Computation of correlation coefficient and regression lines for ungrouped data.
6. Computation of correlation coefficient, forming regression lines for ungrouped data.
7. Computation of correlation coefficient, forming regression lines for grouped data.
8. Computation of multiple and partial correlation coefficients.
9. Computation of correlation ratio

Part – B (Using Excel)

10. Simulation of random samples from Uniform (0,1), Uniform (a,b), Exponential, Normal and Poisson distributions using MS Excel.
11. Fitting of straight line and parabola by the method of least squares using MS Excel.
12. Fitting of power curves of the type $y= a x^b$, $y=a b^x$ and $y=a e^{bx}$ by the method of least squares using MS Excel.
13. Computation of correlation coefficient, forming regression lines using MS Excel.
14. Computation of multiple and partial correlation coefficients using MS Excel.

DEPARTMENT OF MATHEMATICS & STATISTICS

VEERANARI CHAKALI ILAMMA WOMEN'S UNIVERSITY

Koti, Hyderabad – 500095

B.A/B.Sc. II Year III Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - III)

SEC - 2 : Data Collection, Presentation and Interpretation

[2 HPW with 2 Credits and 50 Marks]

Objectives: To learn various methods of data collection, various measures of statistics.
Outcomes: After learning the course the students will be equipped with fundamental statistical knowledge in collecting data, statistical measures

UNIT –I

Basic Concepts on Population, Sample, Sampling unit, Parameter, Statistic, Standard error, Sample Size and its Determination.
Steps in Sample design. Selecting the Problem and necessity of defining the Problem, Designing a questionnaire and a schedule for collecting data for a set of objectives under study with illustrated examples.
Methods for collecting Primary and Secondary data and their merits and demerits.

UNIT II

Graphical computation of Data and Interpretation : Histogram, frequency curve, frequency polygon, ogive curves.
Diagrammatic computation of Data and Interpretation : Bar diagrams (simple, component, multiple, percentage Bars), Pie diagram.
Classification and Tabulation of data. Data Interpretation techniques, Precaution in Interpretation. Data interpretation problems.

Reference Books :

1. Kotahri, C.R (2009): Research Methodology: Methods and Techniques, 2nd Revised Ed. Reprint, New Age International Publishers
2. S. P. Gupta : Statistical Methods.

DEPARTMENT OF MATHEMATICS & STATISTICS

VEERANARI CHAKALI ILAMMA WOMEN'S UNIVERSITY

Koti, Hyderabad – 500095

B.A/B.Sc. II Year IV Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - IV)

Paper - IV : Statistical Inference

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Objectives: To learn various Parametric and Non Parametric tests and difference between them.

To know about Statistical hypothesis and Testing of Statistical Hypothesis

Outcomes: On successful completion of the course students will be able to apply testing methods in statistical inference.

Unit–I

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, test function (non-randomized and randomized). Statement and Proof of Neyman-Pearson's fundamental lemma for Randomized tests. Examples in case of Binomial, Poisson, Exponential and Normal distributions and their power of the test functions.

Unit-II

Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions and difference of standard deviations. Fisher's Z-transformation for population correlation coefficient(s) and testing the same in case of one sample and two samples. Definition of order statistics and statement of their distributions.

Unit – III

Tests of significance based on χ^2 - χ^2-test for specified variance, goodness of fit and test for independence of attributes (rxs, 2xk and 2x2 contingency tables). Tests of significance based on student's - t – t-test for single sample specified mean, difference of means for independent and related samples, sample correlation coefficient. F - test for equality of population variances.

Unit – IV

Non-parametric tests - their advantages and disadvantages, comparison with parametric tests. Measurement scale - nominal, ordinal, interval and ratio. Use of Central Limit Theorem in testing. 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. Use of central limit theorem in testing.

Reference Books:

1. Goon AM, Gupta MK, Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt. Ltd., Kolkata.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi

Additional References:

1. Hoel P.G : Introduction to Mathematical statistics, Asia Publishing house.
2. Sanjay Arora and Bansilal :.New Mathematical Statistics Satya Prakashan , New Delhi
3. Hogg and Craig : Introduction to Mathematical statistics. Prentice Hall
4. Siegal, S., and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
5. Gibbons J.D and Subhabrata Chakraborti : Nonparametric Statistical Inference. Marcel Dekker.
6. Parimal Mukhopadhyay : Mathematical Statistics. New Central Book agency.
7. Conover : Practical Nonparametric Statistics. Wiley series.
8. V. K. Rohatgi and A. K. Md. Ehsanes Saleh : An introduction to probability and statistics, Wiley series.
9. Mood A M, Graybill F A, Boe's DC. Introduction to theory of statistics. TMH
10. Paramiteya Mariyu Aparameteya Parikshalu. Telugu Academy.
11. K.V. S. Sarma: Statistics made simple do it yourself on PC. PHI
12. Gerald Keller : Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
13. Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th Edition, Pearson Publication.
14. Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
15. Milton and Arnold (fourth Edition):Introduction to Probability and Statistics, Tata McGraw Hill Publication.

DEPARTMENT OF MATHEMATICS & STATISTICS

VEERANARI CHAKALI ILAMMA WOMEN'S UNIVERSITY

Koti, Hyderabad – 500095

B.A/B.Sc. II Year IV Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - IV)

Practical – 4 : Statistical Inference

[2 HPW, Credits 1 and Marks 50]

Part – A (Using Calculator)

1. Large sample tests for mean(s), proportion(s), Standard deviation(s) and correlation coefficient.
2. Small sample tests for single mean and difference of means and correlation coefficient.
3. Paired t-test.
4. Small sample test for single and difference of variances.
5. $\chi 2$ – test for goodness of fit and independence of attributes.
6. Nonparametric tests for two independent samples (Median test,Wilcoxon Mann Whitney - U test, Wald - Wolfowitz's runs test)

Part – B (Using Excel)

7. Use of Look up and Reference functions for data analysis.
8. Creating and assigning Macros.
9. Small sample tests for mean(s), paired t-test and correlation coefficient using MS Excel.
10. Small sample test for single and difference of variances using MS Excel.
11. $\chi 2$ – test for goodness of fit and independence of attributes using MS Excel.
12. Nonparametric tests for single and related samples (sign test and Wilcoxon signed rank test) and one sample runs test.

Note : Training shall be on establishing formulae in Excel cells and deriving the results. The Excel output shall be exported to MSWord for writing inferences.

DEPARTMENT OF MATHEMATICS & STATISTICS

TELANGANA MAHILA VISWAVIDYALAYAM

(Autonomous) Koti, Hyderabad – 500095

B.A/B.Sc. II Year IV Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - IV)

SEC - 4 : Data Scaling Techniques and Report writing

[2 HPW with 2 Credits and 50 Marks]

Objectives: To get knowledge on various scaling techniques and writing a report

Outcomes: Students will be able to know about quality checking using Statistical tools

UNIT – I

Qualitative and Quantitative data, Measurement of Scales: nominal, ordinal, interval and ratio scales. Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques. Developing Likert-type Scales, Factor scales and Cumulative Scales their advantages and limitations.

UNIT-II

Interpretation and Report Writing: meaning of interpretation, technique of interpretation, precautions in interpretation, significance of report writing, different steps in writing report. layout of the research report, types of reports, oral presentation, mechanics of writing a research report.

Reference Books :

1. SC Gupta and VK Kapoor : Fundamentals of Applied Statistics, Sultan Chand & Sons
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, The World Press Pvt. Ltd., Kolkata.