MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: I**

Course Title: Descriptive Statistics **Course Code: 20STCCDS13**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To give the students a good practice in presentation and the format most applicable to their own data.
- To provide an understanding for the graduate student on statistical concepts like measures of central tendency, dispersion and moments along with their applications.
- To provide a clear conceptual idea about Regression and correlation analysis for business / economic forecasting.
- To deal with qualitative data.

Course outcomes

CO1: Interpret diagrammatic data presentation for common understanding

CO2: Determine the reliability of an average and compare variability of two or more series and solve problems using moments.

CO3: Interpret bivariate data and apply curve fitting , correlation and regression methods to forecast business data.

CO4: Differentiate between quantitative and qualitative data and apply association and contingency techniques using attributes.

UNIT-I **(10 Hrs.)**

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-II **(10 Hrs.)**

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-III **(10 Hrs.)**

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 **(10 Hrs.)**

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

UNIT-V **(8 Hrs.)**

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, Contingency table: Square contingency**,** Mean square contingency.

Skill/ Hands-on **(12 Hrs.)**

1. Practical case studies to know diagrammatic and Graphical presentation of data
2. To Apply central tendency and dispersion methods to a real life data and to draw valid conclusions from the data
3. Qualitative character study to check their association with each other by considering real life situations.
4. Hands on practice for EXCEL for Statistical applications.

Co-curricular activities

1. Problem Solving
2. Conducting quiz
3. Peer group discussions
4. Seminars by taking real life examples

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao,Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books

1. Willam Feller: Introduction to Probability theory and its applications, Vol –I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics, Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan, New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: I**

Course Title: Descriptive Statistical Methods - Practical

Course Code: 20STP1DS12

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To give the students a good practice in presentation and the format most applicable to their own data.
- To provide hands -on experience for the graduate student on statistical concepts like measures of central tendency, dispersion and moments.
- To provide a clear practical experience about Regression & correlation analysis for business / economic forecasting as well as attributes which deal with qualitative data.

Course outcomes

CO1: Interpret diagrammatic data presentation, determine the reliability of an average using central tendency measures and compare the variability of two or more series.

CO2: Apply the curve fitting, correlation and regression methods to the given data

CO3: Apply Association and Contingency techniques for qualitative data using Attributes.

LIST OF PRACTICALS

1. Graphical presentation of data (Histogram, frequency polygon, Ogives).
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of measures of central tendency(Mean, Median and Mode)
4. Computation of measures of dispersion(Q.D, M.D and S.D)
5. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
6. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.

7. Computation of Karl Pearson’s coefficients of Skewness and Bowley’s coefficients of Skewness.
8. Fitting of Straight line by the method of least squares
9. Fitting of Parabola by the method of least squares
10. Fitting of Power curve of the type by the method of least squares.
11. Fitting of Exponential curve of the type and by the method of least squares.
12. Computation of correlation coefficient and regression lines for ungrouped data
13. Computation of Yule's coefficient of association

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: I**

Course Title: Descriptive Statistics for Business Analytics

Course Code: 22STCCDS14

No. of Hours: 75 **LTP: 410** **Credits: 4**

Objectives

- To give the students a good practice in presentation and the format most applicable to their own data.
- To provide an understanding for the graduate student on statistical concepts like measures of central tendency, dispersion and moments along with their applications.
- To provide a clear conceptual idea about Regression and correlation analysis for business / economic forecasting.

Course outcomes

CO1: Interpret diagrammatic data presentation common understanding

CO2: Determine the reliability of an average and compare variability of two or more series and solve problems using moments.

CO3: Interpret bivariate data and apply curve fitting methods to forecast business data.

CO4: Derive the correlation and regression between two variables.

CO5: Explain the basics of probability, types, theorems and applications in real life.

Unit I **(12 Hrs.)**

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

Unit II **(12 Hrs.)**

Measures of Dispersion: Importance of measures of dispersion, Characteristics, merits of dispersion, Absolute and Relative measures of Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance - their applications in the business field.

Unit III **(12 Hrs.)**

Moments : Central and Non -Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis with their measures (without proofs)

Unit IV **(12 Hrs.)**

Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favorable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 events. Bayes theorem (without proof) and its applications in real life problems.

Unit V **(12 Hrs.)**

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 and simple problems

Correlation: Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient, their properties (without proofs), and simple problems.

Regression: Concept of Regression, Linear Regression: Regression lines, Regression coefficients and its properties (without proofs), Regressions lines for bi-variate data and simple problems. Correlation vs regression.

Skill/ Hands- on **(15 Hrs.)**

1. Practical case studies to know diagrammatic and Graphical presentation of data
2. To Apply central tendency and dispersion methods to a real life data and to draw valid conclusions from the data
3. Qualitative character study to check their association with each other by considering real life situations.
4. Hands on practice for EXCEL for Statistical applications.

Co- curricular activities

1. Problem Solving
2. Conducting quiz

3. Peer group discussions
4. Seminars by taking real life examples

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution Telugu Academy - Dr M.Jaganmohan Rao,Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books

1. Sharma, J. K. : Business statistics, New Delhi: Pearson Education

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA –8
(Affiliated to Krishna University, Machilipatnam)
SYLLABUS

Subject: Statistics **Semester: II**
Course Title: Probability Theory & Distributions
Course Code: 20STCCPD23
No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To deal with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable and mathematical expectation which are essential in all research areas.
- To use various standard theoretical distributions, their chief characteristics and applications in analyzing any data.

Course outcomes

CO1: Explain the basics of probability, types, theorems and applications in real life.

CO2: Interpret Univariate & bi-variate random variables.

CO3: Apply mathematical expectations applications to real data.

CO4: Identify different real life problems and apply discrete and continuous distributions to draw valid inferences

UNIT-I **(10 Hrs.)**

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favorable 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 Bayes theorem and its applications in real life problems.

UNIT-II **(8 Hrs.)**

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 **(10 Hrs.)**

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 - Schwarz inequalities.

UNIT-IV **(10 Hrs.)**

Discrete Distributions: Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Poisson approximation to Binomial distribution. Hyper-geometric distribution: Definition, mean and variance.

UNIT - V **(10 Hrs.)**

Continuous Distributions: Rectangular, Exponential, Gamma, Beta Distributions: mean, variance, M.G.F, C.G.F, C.F.

Normal Distribution: Definition, Importance, Properties, M.G.F, CF, additive property.

Skill / Hands-on **(12 Hrs.)**

1. Practical case studies to apply probability.
2. Review of articles related to the topics in the syllabus
3. Hands-on practice of EXCEL and SPSS for Statistical applications.

Co- curricular activities

1. Peer group discussions on bivariate data applications and their case studies.
2. Problem Solving
3. Conducting quiz
4. Seminars by taking real life examples in case of discrete distributions.
5. Small real life examples to apply different continuous distributions . 6. Preparation of videos on the subject related topics

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books

1. Willam Feller: Introduction to Probability theory and its applications, Volume –I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house. 4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I. 5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7 th edition. Pearson.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
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SYLLABUS

Subject: Statistics **Semester: II**

Course Title: Probability Distributions - Practical **Course Code: 20STP2PD22**

No. of Hours: 30 **LTP: 002** **Credits:2**

Objectives

- To give practical experience on using various discrete distributions by applying them to analyze the real life data.
- To use continuous distributions for practical experience

Course outcomes

CO1: Identify different real life problems
CO2: Apply discrete distributions (Binomial, Poisson, Negative Binomial and Hypergeometric) to the real life situations to draw valid conclusions.
CO3: Interpret continuous distributions (Uniform, Normal and Exponential) in day to day life to draw valid inferences.

List of Practicals

1. Fitting of Binomial distribution – Direct method.
2. Fitting of binomial distribution – Recurrence relation Method.
3. Fitting of Poisson distribution – Direct method.
4. Fitting of Poisson distribution - Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution – Areas method.
8. Fitting of Normal distribution – Ordinates method.
9. Fitting of Exponential distribution.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)
SYLLABUS

Subject: Statistics **Semester: II**

Course Title: Probability Distributions & SI for BA

Course Code: 22STCCDI24

No. of Hours: 75 **LTP: 410** **Credits: 4**

Objectives

- To use various standard theoretical distributions, their chief characteristics and applications in analyzing any data.
- To discuss various topics of Inferential Statistics such as interval estimation, Testing of Hypothesis, large sample tests (Z-test), small sample tests (t-test, F-test, chi-square test) and nonparametric tests which play an important role in many fields like pharmaceutical, business etc.
- To provide understanding the variability between group and within group through Analysis of Variance

Course outcomes

CO1: Identify different real life problems and apply discrete and continuous distributions to draw valid inferences

CO2: Explain the definitions and concepts of estimation and hypothesis testing.

CO3: Interpret t, F and χ^2 distributions and differentiate the types of sample sizes and apply large and small sample tests to real data.

CO4: Differentiate between different types of variations and Interpret the results of ANOVA through computation.

Unit I **(12 Hrs.)**

Discrete Distributions: Binomial, Poisson distributions: Definitions, means, variances, additive property if exists (Without proofs). Simple problems on Binomial and Piosson distributions.

Unit II **(12 Hrs.)**

Continuous Distributions: Rectangular, Exponential, Distributions: Properties.
Normal Distribution: Definition, Importance, Properties (Without proofs), Simple problems

Unit III **(12 Hrs.)**

Theory of estimation: Point and Interval estimation. Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, and sufficiency.

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.

Large sample Tests: Single mean and difference of two means. Single proportion, difference of proportions.

Unit IV **(12 Hrs.)**

Exact Sampling distributions: Chi-square distribution definition, properties and applications.Test for goodness of fit and independence of attributes. t- distribution definition, properties and applications, test for single mean, difference of means and paired t-test for difference of means. F distribution definition, properties and applications.F-test for equality of two population variances and equality of several means.

Unit V **(12 Hrs.)**

Types of sampling: Simple random sampling, stratified sampling, systematic sampling, Their advantages and disadvantages.

ANOVA: Concept and analysis of one way and two way classified data. Simple problems (without derivations)

Skill / Hands-on **(15 Hrs.)**

1. Practical case studies to apply different probability distributions
2. Practical case studies to know concepts of population, parameter, estimator etc.
3. To apply small sample tests and large sample tests to a real life data and to draw valid conclusions from the data
4. To apply ANOVA technique to a real life data and to draw valid conclusions

Co- curricular activities

1. Problem Solving
2. quiz
3. Peer group discussions on different case studies.
4. Seminars by taking real life examples in case of testing of hypotheses.
5. Preparation of videos on the subject related topics

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc II year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics, SultaN Chand & Sons, New Delhi.

Reference books

1. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
2. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan, New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Course Title: Elementary Statistics
Course Code: 20LSCES2
No. of Hours: 30 **LTP: 200** **Credits: 2**

Objectives

- To provide basic understating of general statistical tools and their elementary applications
- To create awareness on the Statistical System particularly in India.

Course Outcomes

CO1: Explain the scope and limitations of statistics, collection and representation of data.
CO2: Interpret central tendency and dispersion measures to the given data.
CO3: Estimate the degree of relationship between variables using the concepts of correlation and regression.

UNIT - I **(8 Hrs.)**

Meaning, scope and limitations of Statistics , Collection of data: Primary and Secondary, Classification and Tabulation, Construction of frequency distribution.

Graphical and Diagrammatic Representation: Histogram, Ogives and Frequency polygon, Simple, Multiple Bar and Pie diagrams

UNIT-II **(10 Hrs.)**

Measures of Central Tendency:

Features of good average, Arithmetic mean, Median, Mode. Empirical relationship between Mean, Median and Mode.

Measures of Dispersion: Range, Quartile Deviation (QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD. Concepts of Skewness and Kurtosis.

UNIT III **(7 Hrs.)**

Familiarization Of the concepts relating to Correlation and Linear Regression. Their applications in the real world.

Skill / Hands-on **(5 Hrs.)**

1. Practical case studies to know diagrammatic and Graphical presentation of data.
2. To Apply central tendency and dispersion methods to a real life data and to draw valid conclusions from the data

Co-curricular activities

1. Problem Solving
2. Conducting quiz
3. Seminars/ Poster presentations

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. Statistical Methods, S.P. Gupta, Sultan Chand and Sons, New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: III**

Course Title: Statistical Inference **Course Code: 20STCCSI33**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To deal with standard sampling distributions like Chi Square, t and F and their characteristics and applications.
- To provide understanding about different techniques of point estimation for estimating the parameter values of population and interval estimation for population parameters.
- To discuss various topics of Inferential Statistics such as interval estimation, Testing of Hypothesis, large sample tests (Z-test), small sample tests (t-test, F-test, chi-square test) and nonparametric tests which play an important role in many fields like pharmaceutical, agricultural, medical etc.

Course outcomes

CO1: Interpret t, F and χ2 distributions in terms of statistics of a sample from a normal distribution.

CO2: Examine different methods of estimation.

CO3: Explain the definitions and concepts of hypothesis testing

CO4: Differentiate the types of sample sizes and apply large and small sample tests to real data.

CO5: Distinguish between parametric and non-parametric tests.

UNIT-I **(10 Hrs.)**

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, χ^2- Distribution: Definitions, properties, interrelations and their applications.

UNIT-II **(8 Hrs.)**

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, and sufficiency. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population parameters estimated by MLE & MME method. Confidence Intervals for mean (When $\sigma^2$is known and unknown).

UNIT-III **(10 Hrs.)**

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, Poisson, Exponential and Normal distributions.

UNIT – IV **(10 Hrs.)**

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-test for single mean, difference of means and paired t-test. χ2-test for goodness of fit and independence of attributes, test for single variance.. F-test for equality of variances.

UNIT – V **(10 Hrs.)**

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**.**

Skill / Hands-on **(12 Hrs.)**

1. Practical case studies to know concepts of population, parameter, estimator etc.
2. To small sample tests and large sample tests to a real life data and to draw valid conclusions from the data

3. Hands on practice for EXCEL and SPSS for runs test, sign test and Wilcoxon-signed rank test, Median test, Wilcoxon –Mann Whitney U test, Wald Wolfowitz's runs test**.**

Co-curricular activities

1. Problem Solving
2. quiz
3. Peer group discussions **on bivariate data applications and their case studies.**
4. Seminars by taking real life examples in case of testing of hypotheses.

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc II year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books

1. Willam Feller: Introduction to Probability theory and its applications.
2. Volume –I, Wiley
3. Goon AM, Gupta MK, Das Gupta B: Fundamentals of Statistics, Vol-I, the World Press Pvt.Ltd., Kolakota.
4. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
5. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
6. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan, New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: III**

Course Title: Statistical Inference- Practical **Course Code: 20STP3SI32**

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To deal with standard sampling distributions like Chi Square, t and F and their characteristics and applications.
- To discuss various topics like Testing of Hypothesis, large sample tests (Z-test), small sample tests (t-test, F-test, chi-square test) and non-parametric tests which play an important role in many fields like pharmaceutical, agricultural, medical etc.

Course outcomes

CO1: Apply Large sample tests and small sample tests to different real life situations

CO2: Distinguish between the Parametric and the non-parametric tests and apply them for real life data.

LIST OF PRACTICALS

1. a) Large sample test for single mean
   b) Large sample test for difference of means
2. a) Large sample test for single proportion
   b) Large sample test for difference of proportions
3. a) Large sample test for difference of standard deviations
   b) Large sample test for correlation coefficient
4. a) Small sample test for single mean
   b) Small sample test for difference of means
5. Small sample test for correlation coefficient
6. Paired t-test (paired samples).
7. a) Small sample test for single variance (χ 2 - test)
   b) Small sample test for difference of variances(F-test)

8. χ 2 - test for goodness of fit and independence of attributes
9. Nonparametric tests for single sample (run test, sign test and Wilcoxon signed rank test)
10. Nonparametric tests for related samples (sign test and Wilcoxon signed rank test)
11. Nonparametric tests for two independent samples (Median test, Wilcoxon –Mann-Whitney - U test, Wald - Wolfowitz' s runs test)

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: III**

Course Title: Business Statistics **Course Code: 20STCCBS34**

No. of Hours: 75 **LTP: 410** **Credits: 4**

Objectives

- The objective of this paper is to give the students a good practice in presentation and the format most applicable to their own data.
- The objective of this course is to provide an understanding for the graduate student on statistical concepts like measures of central tendency, dispersion and moments along with their applications.
- Course aims to provide a clear conceptual idea about correlation analysis for business / economic forecasting.

Course outcomes

CO1: Interpret diagrammatic data presentation which makes it easier for a common man to understand the given data.

CO2: Determine the reliability of an average and compare variability of two or more series

CO3: Derive the correlation between two variables.

UNIT-I **(12 Hrs.)**

Introduction to Statistics: Definition – Importance, Characteristics and Limitations of Statistics -Classification and Tabulation – Frequency Distribution Table -Diagrams and Graphical Presentation of Data (Presentation of the data using MS EXCEL)

UNIT-II **(12 Hrs.)**

Measures of Central Tendency: Types of Averages – Characteristics of good Average - Mean, Median, Mode, Geometric Mean, Harmonic Mean (Problem Solving using MS EXCEL)

UNIT- III **(12 Hrs.)**

Measures of Dispersion: Meaning and Properties of Dispersion – Absolute and Relative Measures - Types of Dispersion-Range - Quartile Deviation (Semi – Inter Quartile Range) -Mean Deviation - Standard Deviation - Coefficient of Variation. (Problem Solving using MS EXCEL)

UNIT-IV **(12 Hrs.)**

Skewness and Kurtosis: Measures of Skewness: Absolute and Relative Measures-Coefficient of Skewness: Karl Pearson's, Bowley's and Kelly's - Kurtosis: Meso kurtosis, Platy kurtosis and Leptokurtosis (Problem Solving using MS EXCEL)

UNIT-V **(12 Hrs.)**

Measures of Relation: Meaning and use of Correlation – Types of Correlation - Karlpearson's Correlation Coefficient - Probable Error Spearman's Rank-Correlation (Problem Solving using MS EXCEL)

Skill / Hands-on **(15 Hrs.)**

1. Practical case studies to know diagrammatic and Graphical presentation of data.
2. To Apply central tendency and dispersion methods to a real life data and to draw valid conclusions from the data

Co-curricular activities

1. Problem Solving
2. Conducting quiz
3. Peer group discussions on bivariate data applications and their case studies.
4. Seminars by taking real life examples in case of Correlation

Prescribed Text Books

1. Business Statistics, Reddy C.R., Deep Publications.
2. Statistical Methods: Gupta S.P.Sultan Chand & Sons.
3. Statistics-Problems and Solutions: Kapoor V.K, Sultan Chand & Sons.

Reference Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: IV**

Course Title: Applied Statistics **Course Code: 20STCCAS43**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To deal with the time series on simple description methods of data, explains the variation, forecasting the future values, control procedures.
- To give an idea of using index numbers in a range of practical situations, limitations and uses
- To enlighten the students in obtaining different mortality, fertility rates thus obtaining the population growth rates and construction and use of life tables in actuarial science.

Course outcomes

CO1: Interpret chronological data to derive trends in economy.

CO2: Analyze the standard of living in different countries using index numbers

CO3: Explain the importance of demography in the development of society.

CO4: Apply the methods of obtaining birth and death rates to draw inferences regarding demography.

CO5: Construct the life table for different age groups to examine the reproduction rates.

UNIT-I **(8 Hrs.)**

Time Series: Time Series and its components with illustrations, additive, multiplicative models. 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 **(10 Hrs.)**

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

UNIT-III **(10 Hrs.)**

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 **(10 Hrs.)**

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 **(10 Hrs.)**

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics.

Measures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

Skill / Hands-on **(12 Hrs.)**

1. Practical case studies to know different kinds of mathematical models of time series.
2. To apply least squares technique to real life data and to draw valid conclusions regarding the trend of the given time series.
3. Case studies to find out the cost of living of the people using Index numbers.
4. Hands on practice on SPSS and R to draw conclusions about the given time series data, Index numbers and demographic data

Co-curricular activities

1. Problem Solving
2. quiz
3. Peer group discussions
4. Seminars

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc III year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao,Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.

Reference books

1. Indian Official statistics MR Saluja.
2. Anuvarthita Sankyaka Sastram - Telugu Academy.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8 (Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: IV**

Course Title: Sampling Techniques & Designs of Experiments

Course Code: 20STCCSD43

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To deal with the ways and methods that should be used to draw samples to obtain the optimum results, i.e., the maximum information about the characteristics of the population with the available sources at our disposal in terms of time, money and manpower to obtain the best possible estimates of the population parameters
- To provide understanding the variability between group and within group through Analysis of Variance
- To give an idea of logical construction of Experimental Design and applications of these designs nowadays in various research areas.

Course Outcomes

CO1: Design and implement surveys using sampling techniques.

CO2: Interpret the results of ANOVA through computation.

CO3: Summarize the principles, phases and scope of designs

CO4: Analyze and interpret basic designs (CRD, RBD and LSD).

CO5: Demonstrate the analysis of full factorial designs.

UNIT-I **(10 Hrs.)**

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 **(10 Hrs.)**

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 **(10 Hrs.)**

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 disadvantages and Statistical analys is of Completely Randomized Design (C.R.D).

UNIT IV **(10 Hrs.)**

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, Missing plot technique in RBD and LSD. Efficiency RBD over CRD, Efficiency of LSD over RBD and CRD.

UNIT V **(8 Hrs.)**

Factorial experiments – Main effects and interaction effects of 2^2 and 2^3 factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals.

Skill / Hands-on **(12 Hrs.)**

1. Practical case studies to know the applicability of different kinds of sampling techniques.
2. To apply ANOVA technique to a real life data and to draw valid conclusions

3. Hands on practice on SPSS and R to draw conclusions about the data pertaining to different experimental designs like CRD , RBD and LSD.

Co curricular Activities

1. Problem Solving
2. Quiz
3. Peer group discussions
4. Seminars

Prescribed Text Books

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics, SultaN Chand & Sons, New Delhi.
2. BA/BSc III year statistics - descriptive statistics, probability distribution - Telugu Academy- Dr M.Jaganmohan Rao,Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.

Reference books

1. Indian Official statistics MR Saluja.
2. Anuvarthita Sankyaka Sastram Telugu Academy.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: IV**

Course Title: Applied Statistical Methods- Practical **Course Code: 20STP5AS42**

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To deal with the time series on simple description methods of data, explains the variation, forecasting the future values, control procedures.
- It gives an idea of using index numbers in a range of practical situations, limitations and uses
- The vital statistics enlighten the students in obtaining different mortality, fertility rates thus obtaining the population growth rates and construction and use of life tables in actuarial science.

Course outcomes

CO1: Apply Trend derivation methods to different chronological series in real life situations.

CO2: Analyze the economy and standard of living in different countries using Index Numbers

CO3: Interpret the methods of obtaining birth & death rates and construct the Life table for living beings from different age groups

LIST OF PRACTICALS

Time Series

1. Measurement of trend by method of moving averages(odd and even period)
2. Measurement of trend by method of Least squares(linear and parabola)
3. Determination of seasonal indices by method of Ratio to moving averages
4. Determination of seasonal indices by method of Ratio to trend

5. Determination of seasonal indices by method of Link relatives

Index Numbers

6. Computation of all weighted index numbers.
7. Computation of reversal tests.

Vital Statistics

8. Computation of various Mortality rates
9. Computation of various Fertility rates
10. Construction of Life Tables

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: IV**

Course Title: Sampling & Designs- Practical **Course Code: 20STP4SD42**

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To deal with the ways and methods that should be used to draw samples to obtain the optimum results, i.e., the maximum information about the characteristics of the population with the available sources at our disposal in terms of time, money and manpower to obtain the best possible estimates of the population parameters
- To provide understanding the variability between group and within group through Analysis of Variance
- To give an idea of logical construction of Experimental Design and applications of these designs nowadays in various research areas.

Course outcomes

CO1: Design and implement surveys with the sampling designs (simple random, systematic, stratified).

CO2: Apply the Basic designs (CRD, RBD and LSD) to real life situations and interpret the results using ANOVA and F-test.

CO3: Demonstrate how to analyze the results of the full Factorial designs.

LIST OF PRACTICALS

Sampling Techniques

Estimation of population mean and its variance by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR.

2. Stratified random sampling with proportional and optimum locations. Comparison between proportional and optimum allocations with SRSWOR.
3. Systematic sampling with N=nk. Comparison of systematic sampling with Stratified and SRSWOR.

Design of Experiments

4. ANOVA - one - way classification with equal and unequal number of observations
5. ANOVA Two-way classification with equal number of observations.
6. Analysis of CRD.
7. Estimation of single missing observation in RBD and its analysis
8. Estimation of single missing observation in LSD and its analysis
9. Analysis of 2^2 with RBD layout
10. Analysis of 2^3 with RBD layout

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Operations Research I **Course Code: 20STSEC11OR3**

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To impart knowledge in concepts and tools of Operations Research
- To understand mathematical models used in Operations Research
- To apply these techniques constructively to make effective business decisions

Course Outcomes

CO1: Identify and develop operational research models from the verbal description of the real system.

CO2: Understand the mathematical tools that are needed to solve optimization problems

CO3: Differentiate between IBFS and OBFS and obtain the solution for LPP

CO4: Differentiate the primal and dual and solve the given LPP and to derive the primal-dual relationship

UNIT-I **(9 Hrs.)**

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.

UNIT-II **(9 Hrs.)**

Linear programming problem (LPP) -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,

UNIT-III **(9 Hrs.)**

General linear programming Problem(GLP) – Definition and Matrix form of GLP problem, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP 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 and Minimization cases)

UNIT-IV **(9 Hrs.)**

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

UNIT-V **(9 Hrs.)**

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 problems. Dual Simplex Method.

Co-curricular Activities

1. Problem Solving
2. Quiz
3. Peer group discussions
4. Seminars
5. Journal reviews

Prescribed Text Books

1. S.D. Sharma, Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.

Reference books

1. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
2. GassS.I: Linear Programming. Mc Graw Hill.
3. HadlyG :Linear programming. Addison-Wesley.
4. Taha H.M: Operations Research: An Introduction : Mac Millan.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Operations Research I-Practical

Course Code: 20STP611OR2

No. of Hours: 45 **LTP: 003** **Credits: 2**

Objectives

- To apply mathematical models of Operations Research to different real life problems.
- To analyze the data by applying OR techniques constructively to make effective business decisions.

Course Outcomes

CO1: Construct a linear programming problem to the given data.
CO2: Apply the mathematical tools to solve optimization problems.
CO3: Calculate IBFS and OBFS to the given LPP

List of Practicals **(30 Hrs.)**

1. Solution of a Linear Programming Problem using Graphical Method with (i) Unbounded solution (ii) Infeasible solution (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using Charne's M - method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method (i) Unrestricted variables (ii) Unbounded solution (iii) Infeasible solution (iv) Alternative or multiple solutions.
6. Problems based on Principle of Duality.
7. Problems based on Dual simplex method.

Skill / Hands-on: Mini Project/Field work/Case study (15 Hrs.)

1. Practical case studies to know the applicability of different kinds of OR techniques.
2. To apply LPP to a real life data and to draw valid conclusions
3. Hands on practice on **LINGO** for Operations Research to draw inferences.

Reference books

1. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
2. GassS.I: Linear Programming. McGraw Hill.
3. Hadley G :Linear programming. Addison-Wesley.
4. Taha H.M: Operations Research: An Introduction : Mac Millan.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Operations Research II **Course Code: 20STSEC12OR3**

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To enrich the knowledge of students with advanced techniques of linear programming problems along with real life applications.
- To apply these techniques constructively to make effective business decisions

Course Outcomes

CO1: Apply and analyze various types of deterministic models like transportation Problem and Assignment problem

CO2: Minimize the total elapsed time in an industry by efficient allocation of resources to suitable persons

CO3: Evaluate real time problems related to Queues,CPM and PERT.

CO4: Demonstrate and solve the simple models of game theory.

UNIT-I **(9 Hrs.)**

Transportation Problem: Introduction, Mathematical formulation of Transportation problem. Definition of 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(U-V method). Degeneracy in transportation problem, Resolution of degeneracy, Unbalanced transportation problem. Maximization TP. Transshipment Problem.

UNIT-II **(9 Hrs.)**

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

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 and algorithm for n jobs on m machines problem, Graphical method for two jobs on m- machines.

UNIT-III **(9 Hrs.)**

Queueing Theory: Introduction, elements of the queuing systemTypes of Queuing models, applications, advantages, disadvantages,Notations, Single channel queuing model, multiple channel queuing model. Problems on M/M1 model.

UNIT-IV **(9 Hrs.)**

Network Scheduling: Basic Components of a network, nodes and arcs, events and activities– Rules of Network construction – Time calculations in networks - Critical Path method (CPM) and PERT.

UNIT-V **(9 Hrs.)**

GameTheory:Two-personzero-sumgames.PureandMixedstrategies.Maxmin and Minimax Principles - Saddle point and its existence. Games without Saddle point-Mixed strategies. Solution of 2 x 2 rectangular games. Graphical method of solving 2 x n and m x 2 games. Dominance Property. Matrix oddment method for n x n games. Only formulation of Linear Programming Problem for m x n games.

Co-curricular Activities

1. Problem Solving
2. Quiz
3. Peer group discussions
4. Seminars
5. Journal reviews

Prescribed Text Books

1. S.D. Sharma, Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohan, Operations Research, Sultan Chand and sons, New Delhi.

Reference books

1. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
2. GassS.I: Linear Programming. McGraw Hill.
3. Hadley G :Linear programming. Addison-Wesley.
4. Taha H.M: Operations Research: An Introduction : Mac Millan.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Operations Research II - Practical

Course Code: 20STP712OR2

No. of Hours: 45 **LTP: 003** **Credits: 2**

Objectives

- To apply advanced techniques of linear programming problems to the real life situations
- To analyze the data by applying optimization techniques constructively to make effective business decisions.

Course Outcomes

CO1: Apply and analyze various types of deterministic models like transportation Problem and Assignment problem

CO2: Maximize the work time and profits of an industry by efficient allocation of jobs to the suitable persons

CO3: Minimize the elapsed time of the projects by using CPM , PERT and queuing models and solve simple game models.

List of Practicals **(30 Hrs.)**

1. IBFS of transportation problem by using North- West corner rule, Matrix minimum method and VAM
2. Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Solution of the sequencing problem—processing of n jobs through two machines
5. Solution of sequencing problem- processing of n jobs through three machines
6. To perform Project scheduling of a given project (Deterministic case-CPM).

7. To perform Project scheduling of a given project (Probabilistic case-PERT).
8. Graphical method of solving for m x 2 and 2 x n games.
9. Solution of m x n games by dominance rule.
10. Solution of n x n games by using matrix oddment method.
11. Linear programming method for solving m x n games.

Skill / Hands-on: Mini Project/ Field Work/ Case study (15 Hrs.)

1. Practical case studies to know the applicability of different kinds of OR techniques.
2. To apply LPP to a real life data and to draw valid conclusions
3. Hands on practice on **LINGO** for Operations Research to draw inferences.

Reference books

1. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
2. GassS.I: Linear Programming. McGraw Hill.
3. Hadley G :Linear programming. Addison-Wesley.
4. Taha H.M: Operations Research: An Introduction : Mac Millan.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Statistical Quality & Process Control

Course Code: 20STSEC21QC3

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To understand the concept of quality, process control and product control using control chart techniques and sampling inspection plan.
- To have an idea about quality management, quality circles, quality movement and standardizations for quality.

Course Outcomes

CO1: Differentiate the concepts of Quality Control(SQC) and Statistical Process Control (SPC)

CO2: Construct different control charts for variables(x-bar, R charts) and attributes(p,np and c charts)

CO3: Identify different acceptance sampling plans and differentiate them.

CO4: Evaluate the probabilities of sampling plans using Binomial and Poisson Distributions

CO5: Understand the structure of OC and ASN curves

UNIT-I **(9 Hrs.)**

Meaning of quality, concept of total quality management (TQM) and six-sigma, ISO, comparison between TQM and Six Sigma, Meaning and purpose of Statistical Quality Control (SQC), Seven Process Control Tools of Statistical Quality Control (SQC) (i) Histogram (ii) Check Sheet, (iii) Pareto Diagram (iv) Cause and effect diagram (CED), (v) Defect concentration diagram (vi) Scatter Diagram (vii) Control chart. (Only introduction of 7 tools is expected).

UNIT-II **(9 Hrs.)**

Statistical basis of Shewhart control charts, use of control charts. Interpretation of control charts, Control limits, Natural tolerance limits and specification limits. Chance causes and assignable causes of variation, justification for the use of 3-sigma limits for normal distribution, Criteria for detecting lack of control situations:

(i) At least one point outside the control limits

(ii) A run of seven or more points above or below the central line.

UNIT-III **(9 Hrs.)**

Control charts for Variables: Introduction and Construction of $\bar{x}$ and R chart and Standard Deviation Chart when standards are specified and unspecified, corrective action if the process is out of statistical control.

Control charts for Attributes: Introduction and Construction of p chart, np chart, C Chart and U charts when standards are specified and unspecified, corrective action if the process is out of statistical control.

UNIT-IV **(9 Hrs.)**

Acceptance Sampling for Attributes: Introduction, Concept of sampling inspection plan, Comparison between 100% inspection and sampling inspection.
Procedures of acceptance sampling with rectification, Single sampling plan and double sampling plan. Producer's risk and Consumer's risk, Operating characteristic (OC) curve, Acceptable Quality Level (AQL), Lot Tolerance Fraction Defective (LTFD) and Lot Tolerance Percent Defective (LTPD), Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL), AOQ curve, Average Sample Number (ASN), Average Total Inspection (ATI).

UNIT-V **(9 Hrs.)**

Single Sampling Plan: Computation of probability of acceptance using Binomial and Poisson approximation, of AOQ and ATI. Graphical determination of AOQL, Determination of a single sampling plan by: a) lot quality approach b) average quality approach.
Double Sampling Plan: Evaluation of probability of acceptance using Poisson distribution, Structure of OC Curve, Derivation of AOQ, ASN and ATI (with complete inspection of second sample), Graphical determination of AOQL, Comparison of single sampling plan and double sample plan.

C0-curricular Activities

1. Problem Solving
2. Quiz
3. Peer group discussions
4. Seminars
5. Journal review

Prescribed Text Books

1. **Parimal Mukhopadhyay:** Applied Statistics, New Central Book Agency.
2. **Goon A.M., Gupta M.K. and Das Gupta B. (1986)**
   Fundamentals of Statistics, Vol. II, World Press, Calcutta.
3. **S.C. Gupta and V.K. Kapoor:** Fundamentals of Applied Statistics Chand publications

Reference books

1. **Montgomery, D. C. (2008)**: Statistical Quality Control, 6th Edn., John Wiley, New York.
2. **R.C. Gupta:** Statistical Quality Control.
3. **Duncan A.J. (1974):** Quality Control and Industrial Statistics, fourth edition D.B. Taraporewala Sons and Co. Pvt. Ltd., Mumbai.
4. **Grant, E. L. and Leavenworth (1980):** Statistical Quality Control, fifth edition, Mc-Graw Hill, New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Computational Techniques & R Programming

Course Code: 20STSEC22CR3

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To learn the statistical analysis with the help of the statistical software
- To make students exercise the fundamentals of statistical analysis in an R environment.

Course Outcomes

CO1: Understand the basic functioning of a computer

CO2: Acquire skills in handling business and organizational data using Excel

CO3: Perform simple analytics using Excel

CO4: Understand the R programming language and its importance in analyzing the data

CO5: Analyze the real life situations statistically using R language.

UNIT-I **(9 Hrs.)**

Computer basics: Basic applications of computer, components of computer system, Central Processing Unit (CPU), input and output units, computer memory and mass storage devices. Programming languages and their applications. Concept of files and folders. Software and types of software. Operating Systems like Windows and Linux.

UNIT-II **(9 Hrs.)**

Data processing using spreadsheets – Data entry and editing features in Excel, copy, paste, paste special options, sort and filter options, auto sum, steps of finding average and standard deviation of data using statistical functions. Matrix operations like transpose, multiply and inverse using Excel functions. Simple graphs like bar chart, line chart and pie chart in Excel. Exporting Excel output to word processors like MS-Word and slide presentations like PowerPoint.

UNIT-III **(9 Hrs.)**

Scatter diagram, fitting of straight line, polynomial and power curves using Excel - Reading R square value and equation from the graph. Predicting future values using ‘forecast’ and ‘trend’ functions. Data Analysis Pak and its features. Performing Student’s t-test and one-way Analysis of Variance using Data Analysis Pak. P-value and its interpretation.

UNIT-IV **(9 Hrs.)**

Programming with R: Introduction to R, Data types in R (numeric, logical, character, complex etc.), R objects: vector, matrix, array, list, data frame, factor, and time series. Arithmetic, logical and relational operators, explicit and implicit looping, functions and functional programming in R, Lexical scoping rules in R, benefits of Lexical scoping, other scoping rules, debugging facility in R. Few important mathematical, statistical and graphical functions in R.

UNIT-V **(9 Hrs.)**

Descriptive Statistics with R software: Calculations with R software such as descriptive statistics, frequency distribution, Graphics and plots, statistical functions of central tendency, variation, skewness and kurtosis and illustration with examples.

Co-curricular Activities

1. Program writing
2. Quiz
3. Peer group discussions
4. Seminars

Prescribed Text Books

1. K.V.S. Sarma (2010), Statistics Made Simple – Do it yourself on PC, 2nd Edition, Prentice Hall India
2. Sudha G. Purohit, SharadD.Gore, and ShailajaR.Deshmukh (2008), Statistics Using R, Narosa Publishing House, India.

Reference books

1. Chambers, J. (2008). Software for Data Analysis: Programming with R, Springer.
2. Crawley, M.J. (2017). The R Book, John Wiley & Sons.
3. Eckhouse, R.H. and Morris, L.R. (1975). Minicomputer Systems Organization, Programming and Applications, Prentice-Hall.
4. Matloff, N. (2011). The Art of R Programming, No Starch Press, Inc.
5. Peter N. (1986). Inside the IBM PC, Prentice-Hall Press.
6. Dr. Mark Gardener(2012): Beginning R The statistical Programming Languages, John Wiley & Sons.
7. Crawley, M.J. (2006). Statistics – An introduction using R. John Wiley

London.
8. Purohit, S.G., Deshmukh, S.R. and Gore, S.D., (2015): Statistics using R, Alpha Science International.
9. Verzani, J., (2018): Using R for introductory statistics. CRC press.
10. Schumacker, R.E., (2014): Learning statistics using R. Sage Publications.
11. Michale J. Crawley (2009), THE R BOOK, John Wiley & Sons.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Computational Techniques & R Programming - Practical

Course Code: 20STP722CR2

No. of Hours: 45 **LTP: 003** **Credits: 2**

Objectives

- To do the statistical analysis with the help of the statistical softwares
- To make students exercise the fundamentals of statistical analysis in an R environment.

Course Outcomes

CO1: Perform simple analytics using Excel

CO2: Apply R programming language the data pertaining to different fields

CO3: Analyze the real life situations statistically using R language.

List of Practicals **(30 Hrs.)**

1. Construction of Bar Chart and Pie Chart using Excel
2. Fitting of straight-line using Excel
3. Calculating Matrix Inverse using Excel
4. One way ANOVA using Excel
5. Data visualization using R - frequency polygon, Ogives, Histogram.
6. Data visualization using R - simple and multiple bar diagram, pie chart.
7. Computation of Descriptive Statistics using R - Central Tendencies, Dispersions, Moments, Skewness and Kurtosis.
8. Computation of Karl Pearson's Coefficient of Correlation and Rank Correlation using R.
9. Construction of Control Charts for variables (x, R and σ) charts using R.
10. Construction of Control Charts for attributes (p, np charts with fixed and varying sample sizes) using R.
11. Construction of Control Charts (C and U) using R.

Skill / Hands-on: Mini Project/Field work/Case study (15 Hrs.)

1. Performing simple analytics using Excel
2. To write programs using R language to real life data and to draw valid conclusions
3. Hands on practice on SPSS and R to draw conclusions about the data pertaining to different fields.

Reference books

1. Chambers, J. (2008). Software for Data Analysis: Programming with R, Springer.
2. Crawley, M.J. (2017). The R Book, John Wiley & Sons.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Econometrics **Course Code: 20STSEC31EM3**

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To provide the students with some useful tools for future research.
- To help the student to develop a way of thinking in quantitative terms

Course Outcomes

CO1: Understand various important econometric models

CO2: Understand the assumptions upon which different econometric methods are based and their implications

CO3: Explain core concepts and techniques in econometrics, with a special focus on the classical linear regression model

CO4: Interpret heteroscedasticity and its inherent concepts including its consequences

UNIT-I **(9 Hrs.)**

Basic Econometrics: Nature of econometrics and economic data, concept of econometrics, steps in empirical economic analysis, econometric model, importance of measurement in economics, the structure of econometric data, cross section, pooled cross section, time series and paired data.

UNIT-II **(9 Hrs.)**

Models and Estimations: Simple regression models- two variable linear regression model, assumptions and estimation of parameters. Gauss Markoff theorem, OLS estimations, partial and multiple correlations coefficients. The general linear model assumptions, estimation and properties of estimators, BLUEs.

UNIT-III **(9 Hrs.)**

Heteroscedastic disturbances : Tests of significance of estimators, R square and ANOVA. Concepts and consequences of heteroscedasticity. Tests and solutions of heteroscedasticity. Specification error, Errors of measurement.

UNIT-IV **(9 Hrs.)**

Multicollinearity: The concept of multicollinearity and its consequences on econometric models, detection of multicollinearity. Measure of Multicollinearity – Variance Inflation Factor (VIF) and tolerance, formula and interpretation. Methods of reducing the influence of multicollinearity.

UNIT-V **(9 Hrs.)**

Autocorrelation: Disturbance term (u) in econometric models and its assumptions, autocorrelated disturbances and their consequences on the model parameters, Detecting the presence of autocorrelation – hypothesis tests for autocorrelation - Durbin Watson test and its interpretation.

Co-curricular Activities

1. Program writing
2. Quiz
3. Peer group discussions
4. Seminars

Prescribed Text Books

1. Gujarati, D. and Sangeetha, S. (2007). Basic Econometrics, 4th Edition, McGraw Hill Companies.

2. Maddala, G.S. and Lahiri, K. (2009): Introduction to Econometrics, 4th Edition, John Wiley & Sons.

Reference books

1. Johnston, J. (1972). Econometric Methods, 2nd Edition, McGraw Hill International.
2. Koutsoyiannis, A. (2004). Theory of Econometrics, 2nd Edition, Palgrave Macmillan Limited.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Econometrics - Practical

Course Code: 20STP631EM2

No. of Hours: 45 **LTP: 003** **Credits: 2**

Objectives

- To provide the students with some useful tools for future research.
- To help the student to develop a way of thinking in quantitative terms

Course Outcomes

CO1: Estimate the parameters of general linear trend.
CO2: Forecast the general linear trend
CO3: Diagnose and evaluate the consequences of the Multicollinearity, Autocorrelation and Heteroscedasticity

List of Practicals (30 Hrs.)

1. Problems based on estimation of General linear model.
2. Testing of parameters of General linear model.
3. Forecasting of General linear model.
4. Problems concerning specification errors.
5. Problems related to consequences of Multicollinearity.
6. Diagnosis of Multicollinearity.
7. Problems related to consequences of Autocorrelation (AR(I)).
8. Diagnostics of Autocorrelation.
9. Estimation of problems of General linear model under Autocorrelation.
10. Problems related to consequences of Heteroscedasticity.

Skill / Hands-on: Mini Project/Field work/Case study (15 Hrs.)

1. Developing theories for existing hypothesis in finance
2. Forecast future economic or financial trends
3. Hands on practice on SPSS and R to draw conclusions about the data pertaining to economic/ financial aspects.

Reference books

1. Johnston, J. (1972). Econometric Methods, 2nd Edition, McGraw Hill International.
2. Koutsoyiannis, A. (2004). Theory of Econometrics, 2nd Edition, Palgrave Macmillan Limited.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Regression Analysis **Course Code: 20STSEC32RA3**

No. of Hours: 45 **LTP: 300** **Credits: 3**

Objectives

- To build a greater understanding, theoretical underpinning, and tools for applying the linear regression model and its generalizations.
- To explores the workings of multiple regression and problems that arise in applying it, as well as going deeper into the theory of inference underlying regression
- To emphasize the need to fit appropriate models to the underlying processes generating the data being explained.

Course Outcomes

CO1: Understand Linear and Multiple Linear regression

CO2: Analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables

CO3: Apply statistical tests of hypotheses on regression coefficients

CO4: Interpret the best regression model

UNIT-I **(9 Hrs.)**

Simple Linear Regression: Simple Linear Regression Model. Least-Squares Estimation of the Parameters - Estimation of β_0 and β_1, Properties of the Least-Squares Estimators and the Fitted Regression Model. Hypothesis Testing on the Slope and Intercept -Use of t Tests, Testing Significance of Regression and Analysis of Variance

UNIT-II **(9 Hrs.)**

Multiple Linear Regression: Multiple linear regression: Multiple Linear Regression Model. Estimation of model parameters: Least-Squares Estimation of the Regression Coefficients, Properties of the Least-Squares Estimators. Concept of residual, Residual plots. Test for Significance of Individual Regression Coefficients, and subsets of coefficients. Concept of coefficient of determination.

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UNIT-III **(9 Hrs.)**

Regressions with Qualitative Independent Variables: Use of dummy variables to handle categorical independent variables in regression. Estimation of model parameters with dummy variables - Testing the structural stability of regression models, comparing the slopes of two regression models. Multiple linear regression with interaction effects.

UNIT-IV **(9 Hrs.)**

Regressions with Qualitative Dependent Variables: Binary logistic regression with several independent variables, estimation of coefficients, evaluating the Odds Ratio (OR) and its interpretation. The concept of Piecewise linear regression, The Logit,Probit and Tobit models and their applications.

UNIT-V **(9 Hrs.)**

Best Model: Selecting 'Best' regression model. All possible regressions – R^2, Adjusted R^2, MS_{Res}, Mallow's statistic. Sequential selection of variables – criteria for including and eliminating a variable – forward selection, backward elimination and stepwise regression.

Co-curricular Activities

1. Case studies
2. Quiz
3. Peer group discussions
4. Seminars

Prescribed Text Books

1. Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining (2012), Introduction To Linear Regression Analysis, Fifth Edition, John Wiley & Sons

Reference books

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis. 3rd Edition. John Wiley.
2. Hosmer, D. W., Lemeshow, S. and Sturdivant R.X. (2013). Applied Logistic Regression, Wiley Blackwell.
3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2013). Introduction to Linear Regression Analysis. 5th Edition. Wiley.
4. Neter, J., Kutner, M. H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied Linear Statistical Models, 4th Edition, Irwin USA.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics **Semester: V/VI**

Course Title: Regression Analysis - Practical

Course Code: 20STP732RA2

No. of Hours: 45 **LTP: 003** **Credits: 2**

Objectives

- To apply the linear regression model to real life data.
- To fit appropriate multiple regression models to the given data

Course Outcomes

CO1: Analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables

CO2: Apply statistical tests of hypotheses on regression coefficients

CO3: Derive the best regression model

List of Practicals **(30 Hrs.)**

1. Least Squares estimates of slope and intercept
2. Plotting of two Regression Lines
3. Finding R-square value of Linear Models
4. Student's t-test for regression coefficient
5. ANOVA for Multiple Linear Regression model
6. Selecting best regression model by R^2
7. Selecting best regression model by Adjusted R^2
8. Selecting best regression model by MSRes
9. Selecting best regression model by Mallow's statistic
10. Selecting best regression model by forward selection
11. Selecting the best regression model by backward elimination

Skill / Hands-on: Mini Project/Field work/Case study (15 Hrs.)

1. Developing theories for existing hypothesis in business
2. Forecast future business(Profits/ Production/ Sales) trends
3. Case studies to study trends of different components of business
4. Hands on practice on SPSS and R to draw conclusions about the data pertaining to economic/ financial aspects.

Reference books

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis. 3rd Edition. John Wiley.
2. Hosmer, D. W., Lemeshow, S. and Sturdivant R.X. (2013). Applied Logistic Regression, Wiley Blackwell.
3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2013). Introduction to Linear Regression Analysis. 5th Edition. Wiley.
4. Neter, J., Kutner, M. H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied Linear Statistical Models, 4th Edition, Irwin USA.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Statistics

Course Title: Basic Statistical Tools **Course Code: 22CERSLST1**

No. of Hours: 30 **Credits: 1**

Objectives

- To apply academic skills and knowledge to address real-life needs in community.
- To identify and analyze the women & child related issues in the selected community.
- To give experiential opportunities to the students to learn real world contexts and develop skills of community engagement

Course outcomes

CO1: Describe the concept of Service learning to the needs of selected community.

CO2: Analyze the issues related to women and children of the society by using different statistical tools.

CO3: To develop civic engagement skills by enhancing their group, organizational and interpersonal skills

UNIT-I: Introduction **(10 Hrs.)**

Service Learning - Meaning - Concept - Importance - Principles - Ethical Concerns - Identification of Community - Need Analysis.

Activities

1. Introduce the concept of Service Learning through a case study/ role play/ animation/graphical representation etc.
2. Need-based analysis in a selected community through observations.
3. Identify the target group.

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UNIT-II: Statistical Tools (10Hrs.)

Data collection on the selected issues- representation using Bar, Pie. Calculation of average and variation values of the selected communities. Finding the correlation of problems and testing the data by using different hypothesis tests.

Activities

1. Meeting the target group
2. Data collection & applying suitable Statistical methods

UNIT-III: Community Engagement & Analysis of Data (10 Hrs.)

Engage with Community – Propose solutions for the need - Analysis of data – Reflection on Experiences – Create Awareness.

Activities

1. Analyze the data by using statistical tools.
2. Create awareness and analyze the problems.
3. Reflections and Recommendations.
4. Implement suitable solutions to the issues.
5. Generate a research report.

References / Web links

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
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SYLLABUS

Extracurricular Activity: Dance **Course Code: ECA1DN**
No. of Hours: 30 Hrs. **Credits: 1**

Objectives

- To obtain the knowledge of different dance forms from various cultures.
- To demonstrate the knowledge through depicting different dance forms.

Course Outcomes

CO1: Differentiate the Hand gestures, eye and neck movements.
CO2: Demonstrate their knowledge through formal and informal performances.
CO3: Identify different dance forms.

1. Prarthana Slokas
   Practice: Tham digi digi thi -3 **(3 Hrs.)**
2. Asamyuta Hasta Mulu-28 vani Perlato
   Practice: Thayhi Thayhi DiTham-4 **(4 Hrs.)**
3. Samyutha Hastha Mulu-24 vani Perlatho
   Practice: Thayhi Thayhi DiTham-4 **(4 Hrs.)**
4. Bhartiya Shastriya Nrutya Retulu-Rastramula Perlu
   Seero Bedhamulu-9
   Practice: Tho Dhimi-3 **(4 Hrs.)**
5. Greeva Bedhamulu -4, Drishti Bedhamulu-8 **(4 Hrs.)**
   Practice:Di Dhi Thi-2
6. Bhru Bedhamulu-6
   Practice:Tham Thatta Dhimda-1 **(3 Hrs.)**
7. PariBhasha Padamulu-Natyamu, Nruthamu, Nrutyamu,
   Lasyamu, Thandavam **(5 Hrs.)**
   Slokamulu: Angikam- GuruBhramha **(3 Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
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SYLLABUS

Extracurricular Activity: Dance **Course Code: ECA2DN**
No. of Hours: 30 Hrs. **Credits: 1**

Objectives

- To stimulate conscious understanding of the language of movement and to develop skill in movement expression.
- To perform movement from different dance techniques with rhythm.

Course Outcomes

CO1: Identify the use of space, placement and music.
CO2: Correlate the people for best performance.
CO3: Discuss the difference between the dance forms.

1. Thalamulu-7
   Jathulu-5
   Practice: Tha thai hitha-4 **(4 Hrs.)**

2. Thalamgamulu-
   Laguvu-druthamu-anudruthamu.
   Paribhasha Padamulu
   Bhavamu-rasamu-patra-apatra-chari-karasikamu
   Practice:Tha thai thai thatha-4 **(8 Hrs.)**

3. Nritya Shastra Kathalu, Navarasamulu
   Practice: Mukthayi-4, Nadaka **(4 Hrs.)**

4. Nathayamu puttuka
   Chaturvidha abinayamulu
   Practice:Jathi,Slokam-sakhakalpa
   Kolatham **(6 Hrs.)**
   Practice: Janapada nrutyam, Padha karma **(4 Hrs.)**

5. Bharatiya sastriya nritya raithulu-vivarasikam
   Practice: Padha karma, Kimkini. **(4 Hrs.)**