

**DEPARTMENT OF STATISTICS
PAPER – I : Descriptive Statistics and Probability**

Unit – I

Descriptive Statistics :Concepts of primary and secondary data methods of collection and editing of primary data Designing a questionnaire and a schedule presentation of data , construction of frequency table. Diagrammatic and graphical representation of ungrouped and grouped data .Bar diagrams . Histogram, frequency curve, Ogives, Box plots. Measures of central tendency and Measures of dispersions central and non central moments and their interrelationship. sheppard's corrections for moments. Measures of Skewnees and kurtosis.

Unit-II

probability: Random experiment ,trial ,outcome, sample space, event., mutually exclusive and exhaustive events, equally likely and favorable outcomes .mathematical, statistical and axiomatic definitions of probability. Addition and Multiplication theorems of probability. BOOLE'S inequality. And Baye's theorem problems on probability.

Unit-III

Random variables: Definition of random variable ,Discrete and continuous random variables, Functions of random variable, Probability mass function ,Probability density function .Distribution function and its properties , Bivariate random variable , joint , marginal and conditional distributions. Independence of random variable.

Unit –I

Mathematical Expectation : Definition of mathematical expectation , mathematical expectation of random variable and of a function of a random variable . Moments and covariance using Mathematical Expectation with example. Addition and Multiplication theorems on Expectation. Definition of Moment generating function, cumulative generating function, probability generating function ,characteristic function statements of properties. Chebyshev and Cauchy – Schwartz inequalities. And their applications. Weak law of large numbers and central limit theorem (statement only)

Paper -II Probability Distribution

Unit –I

Discrete Distribution-I : Uniform , Bernoulli, Binomial and Poisson Distributions, their definitions first four central moments Moment generating function, cumulative generating function, probability generating function mean , variance, additive property if exists. Poisson approximation to Binomial distribution.

Unit –II

Discrete Distribution-II :

Negative Binomial distribution , geometric ,hyper geometric distribution – definitions. Mean ,variances. Moment generating function, cumulative generating function, probability generating function ,characteristic function, reproductive property if exists. Binomial approximation to hyper geometric distribution, Poisson approximation to Negative Binomial distribution. lack of memory property of geometric distribution

Unit –III

Continuous distribution -I: Rectangular and normal distribution . normal distribution as limiting case of Binomial distribution and Poisson Distributions, importance and properties normal distribution .

Unit –IV

Continuous distribution –II : Exponential ,Gamma, Beta distributions of 2 kind (Mean and variance only) Cauchy (definition and c.f only) properties and application (statements only)of these distributions .

(MODIFIED SYLLABUS)

DEPARTMENT OF STATISTICS (W.E.F 2015-2016)

PAPER – I : Descriptive Statistics and Probability

Unit – I

Concepts of primary and secondary data methods of collection and editing of primary data Designing a questionnaire and a schedule presentation of data , construction of frequency table. Diagrammatic and graphical representation of ungrouped and grouped data .Bar diagrams . Histogram, frequency curve, Ogives, Box plots. Measures of central tendency : mean, median, mode , harmonic mean , geometric mean.

Unit – II

Measures of dispersions : Range ,Quartile deviation, standard deviation and mean deviation and their advantages and disadvantages . coefficient of variance and their simple problems .derive central and non central moments and their interrelationship. sheppard's corrections for moments. Skewnees and kurtosis.

Unit-III

Basic concepts of probability: Random experiment ,trial ,outcome, sample space, event., mutually exclusive and exhaustive events, equally likely and favorable outcomes .mathematical,statistical and axiomatic definitions of probability. Addition theorem of probability for 2,3,and n events and BOOLE'S inequality with proof. And their numerical problems.

Unit : IV

Conditional event ,conditional probability examples and applications . Independent events. Multiplication theorems of probability for 2,3, and n events and Baye's theorem and problems based on Baye's theorem.

Unit-V

Random variables: Definition of random variable ,Discrete and continuous random variables, Functions of random variable, Probability mass function ,Probability density function .Distribution function and its properties , Bivariate random variable , joint , marginal and conditional distributions. Independence of random variable. And their empherical problems.

Paper -II Mathematical Expectation and Probability Distribution

Unit –I

Mathematical Expectation : Definition of mathematical expectation , mathematical expectation of random variable and of a function of a random variable . Moments and covariance using Mathematical Expectation with example. Addition and Multiplication theorems on Expectation. Definition of Moment generating function, cumulative generating function, probability generating function ,characteristic function statements of properties. Chebyshev and Cauchy – Schwartz inequalities.

Unit –II

Discrete Distribution : Bernoulli, Binomial and Poisson Distributions, their definitions first four central moments Moment generating function, cumulative generating function, probability generating function mean , variance, additive property if exists. Poisson approximation to Binomial distribution.

Unit –III

Negative Binomial distribution , geometric ,hyper geometric distribution – definitions. Mean ,variances. Moment generating function, cumulative generating function, probability generating function ,characteristic function, reproductive property if exists. Binomial approximation to hyper geometric distribution, Poisson approximation to Negative Binomial distribution. lack of memory property of geometric distribution

Unit –IV

Continuous distribution: rectangular , exponential ,Gamma, Beta distributions of 2 kind (Mean and variance only)other properties such as Moment generating function, cumulative generating function, ,characteristic function, reproductive property if exists .

Unit –V

Normal distribution: definition , importance , properties , Moment generating function, additive property. Interrelation between normal and binomial , Poisson ,gamma and Cauchy distribution – definition , characteristic function and additive property.

Academic year(2016-2017) BOS meeting held on 23-09-2016

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DEPARTMENT OF STATISTICS

(Old Syllabus)

Paper – III : Statistical Methods and Theory of estimation

UNIT – I

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. Correlation ratio , concept of multiple and partial correlation coefficients(three variables only) and properties

UNIT – II

Curve fitting: Definition of Bi- variate data, Principle of least squares, fitting of k^{th} degree polynomial .Fitting of straight line Fitting of Second degree polynomial or parabola , Fitting of power curve and exponential curves of (first and second kind)and with problems.

Regression : Concept of Regression , fitting of two Linear Regressions and it's properties, Regressions Correlation vs regression. concept of multiple linear regression and partial regression

UNIT – III

Sampling Distributions :

Basic concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Exact sampling distribution – independent of sampling distribution of sample arithmetic mean and variance .Definition and properties of Student t- distribution, F – Distribution, χ^2 Distributions and its. Applications, the relationship between t and F – distribution and the relationship between F and chi square distribution

UNIT – V

Estimation : Estimate and Estimator, Point Estimation and Interval Estimation, Criteria of good estimators: Unbiasedness, Consistency, Efficiency and Sufficiency, with examples(problem in case Binomial distribution , Poisson distribution , exponential distribution and Normal distribution), Statement of Neymann Factorization theorem(statement only) Rao cramer inequality and Rao Blackwell theorem . concept of MUVB, Estimation methods: Method of estimation and properties Maximum likelihood estimation and Method of moments .

Interval Estimation : Confidence intervals for the parameters of normal population ; concept of Nyman's shortest confidence intervals.

Paper – IV : TESTING OF HYPOTHESIS

UNIT - I

Testing of Hypothesis: Hypothesis, Null hypothesis and Alternative Hypothesis, Simple and composite hypothesis, Critical region, One tailed and Two tailed tests, Two Types of Errors, Level of significance, Degrees of freedom, Power of the test most power full test and uniformly most power full test and simple problems, Neyman Pearson's Lemma with proof, problems in case of Binomial Distribution, Poisson, exponential Distribution and Normal Distribution.

UNIT - II

Large Sample Tests: Single Mean and Difference between Two means test, Single proportion and Difference between Two proportions test, Difference between Two Standard Deviations test, Fisher's Z- Transformation: Single correlation coefficient and Difference between Two correlation coefficients and problems.

UNIT - III

Small Sample Tests: Single mean and Difference between Two means, Paired t- test. F - test. (χ^2) – test: t-test for testing the significance of an observed correlation coefficient Single variance test, Goodness of fit of B.D and P.D, 2X2 contingency test, Independence of attributes test and problems.

UNIT – IV

Non-Parametric Test: Definition, Assumptions, Advantages, disadvantages, Uses. Measurement scale : Nominal, ordinal, interval and ratio. One sample test : Run test Sign test, Wilcoxon's signed rank test. Paired samples test : Sign test, Wilcoxon's signed rank test. Independent samples : Wald Wolfowitz run test Median test, Mann Whitney U – test and problems.

(Modified Syllabus)

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DEPARTMENT OF STATISTICS W.E.F 2016-2017

Paper – III : Statistical Methods

UNIT – I

Curve fitting: Definition of Bi- variate data, Principle of least squares, fitting of k^{th} degree polynomial .Fitting of straight line ($y = a + bx$), Fitting of Second degree polynomial or parabola ($y = a + bx + cx^2$), Fitting of power curve ($y = ax^b$) and exponential curves of type i) $y = ae^{bx}$ and ii) $y = ab^x$ with problems.

UNIT – II

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. Correlation ratio , concept of multiple and partial correlation coefficients (three variables only) and properties

UNIT – III

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. concept of multiple linear regression and partial regression. (definitions only)

UNIT – IV

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 (χ^2), Mean square contingency (ϕ^2), Coefficient of mean square contingency (C), Tschuprow's coefficient of contingency (τ^2).

UNIT – V

Basic concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Definition and properties of Student t- distribution, F – Distribution, χ^2 Distributions and its Applications, the relationship between t and F – distribution and the relationship between F and χ^2 distribution .

Reference Books:

1. Fundamentals of mathematical statistics: S.C.Guptha and V.K. Kapoor
2. Outlines of statistics, Vol II: Goon Guptha, M.K.Guptha and Das Guptha B
3. Introduction to mathematical Statistical : Hoel P.G
4. BA/BSc II year statistics- Statistical methods and inference- Telugu Academy
5. Statistics Made simple Do it yourself on PC By K.V.S. Sarma
6. Applied Statistics with Microsoft Excel By Gerald Keller

Practical Paper - III

1. Calculation of Correlation coefficient for un grouped data (Direct method)
2. Calculation of Correlation coefficient for un grouped data (Indirect method)
3. Calculation of Correlation coefficient for Bi-variate data
4. Calculation of Rank correlation coefficient with and without ties
5. Construction of two regressions lines for un grouped data
6. Construction of two regressions lines for Bi-variate data
7. Calculation of Multiple Correlation coefficients.
8. Calculation of Partial Correlation coefficients.
9. Fitting of straight line $y = a + bx$
10. Fitting of second degree polynomial or parabola $y = a + bx + cx^2$
11. Fitting of exponential curve $y = ae^{bx}$
12. Fitting of exponential curve $y = ab^x$
13. Fitting of power curve $y = ax^b$
14. Calculation of Yule's coefficient of association and colligation
15. Calculation of Coefficient of mean square contingency (C), Tschuprow's coefficient of contingency (τ^2).

Note : The above practical are to be done using M S Excel and SPSS Package where ever it is possible

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DEPARTMENT OF STATISTICS

Paper – IV : Statistical inference(w.e.f : 2016-2017)

UNIT - I

Estimation : Estimate and Estimator, Point Estimation and Interval Estimation, Criteria of good estimators: Unbiasedness, Consistency, Efficiency and Sufficiency, with examples(problem in case Binomial distribution , Poisson distribution , exponential distribution and Normal distribution), Statement of Neymann Factorization theorem(statement only) . concept of MUVB, Estimation methods: Method of Maximum likelihood estimation, Method of moments and its properties. Interval Estimation: Confidence limits for mean μ and variance σ^2 .

UNIT - II

Testing of Hypothesis: Hypothesis, Null hypothesis and Alternative Hypothesis, Simple and composite hypothesis, Critical region, One tailed and Two tailed tests, Two Types of Errors, Level of significance, Degrees of freedom ,Power of the test most power full test and uniformly most power full test and simple problems, Neyman Pearson's Lemma with proof, problems in case of Binomial Distribution, Poisson, exponential Distribution and Normal Distribution.

UNIT - III

Large Sample Tests: Single Mean and Difference between Two means test, Single proportion and Difference between Two proportions test, Difference between Two Standard Deviations test,Fisher's Z- Transformation: Single correlation coefficient and Difference between Two correlation coefficients and problems.

UNIT - IV

Small Sample Tests: Single mean and Difference between Two means , Paired t- test. F - test. (χ^2) – test: t-test for testing the significance of an observed correlation coefficient Single variance test, Goodness of fit of B.D and P.D, 2X2 contingency test,Independence of attributes test and problems.

UNIT – V

Non-Parametric Test: Definition, Assumptions, Advantages, disadvantages, Uses. Measurement scale : Nominal, ordinal, interval and ratio.One sample test : Run test Sign test, Wilcoxon's signed rank test. Paired samples test : Sign test , Wilcoxon's signed rank test. Independent samples : Wald Wolfowrized run test Median test, Mann Whitney U – test and problems.

Academic year(2017-2018) BOS meeting held on 29-08-2017

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DEPARTMENT OF STATISTICS
(Old Syllabus)

Paper - V: APPLIED STATISTICS-I

Unit-I

Sample Surveys:

Concepts of population,parameter,sample ,statistic,sampling frame,determination of sample Size,sampling distribution,standard error,use of standard error;
Sampling and non sampling errors,census and sample surveys,sources and treatment of non Sampling errors,advantages and limitations of sampling .principle steps of sample survey,main Steps in a large scale sample survey,pilot survey,
Types of sampling : Random and non random sampling techniques

Unit –II

Sampling Techniques:

Simple Random Sampling : SRSWR&SRSWOR,Estimation of population mean,total,and Proportion,their variances and the estimates of variances.
Stratified random sampling: Need for Stratification Estimation of mean,and its variances with Respect to Proportional and Optimum allocations,comparison with srs
Systematic random sampling :Selection of systematic random sample,concept of linear trend, Estimation of mean and its variance,comparison with srs&strs;
Advantages & disadvantages of sampling techniques

Unit – III

Analysis of Variance:

Statement of GAUSS-MARKOFF theorem,ANOVA model,Statement of Cochran's theorem And application
ANOVA technique-One way classification with equal and unequal number of observations;
Two way classification with single observation per cell,concept of critical difference and its use.
Concept of fixed ,random and mixed effect model.
Basic concepts in design of experiments,Principles of experimentation;

Unit – IV

Analysis & Design of experiments:

Analysis of Completely randomized Design(C.R.D),Randomized Block Design(R.B.D) and Latin Square Design(L.S.D) ,advantaged & disadvantages,Single missing plot technique in RBD,LSD,Concept of efficiency of design,Comparison among CRD,RBD &LSD(with out derivation).
Analysis of 2^2 factorial design.

Paper – VI: QUALITY & RELIABILITY

Unit – I

Statistical process control:

Importance of SQC in industry, Statistical basis of Shewart control charts, Construction of Control charts for variables (mean, range and standard deviation).

Unit – II

Statistical control charts for attributes:

p, np and c- charts with fixed and varying sample sizes. Interpretation of control charts, Natural tolerance limits and specification limits, process capability index. Concept of Six sigma and its importance.

Unit – III

Acceptance sampling plans:

Producers risk and consumer's risk. Concept of AQL and LTPD. Single and Double sampling plans for attributes and derivation of their OC and ASN functions. Design of single and double sampling plans for attributes using Binomial.

Unit – IV

Reliability:

Introduction, Hazard function, Exponential distribution as life model, its memory-less property. Reliability function and its estimation. Concepts of censoring and truncation. System reliability- series, parallel and k out of N systems and their reliabilities.

Paper-VII: APPLIED STATISTICS-II

UNIT-I

TIME SERIES: Time series and its components with illustrations; additive, multiplicative and mixed models; Determination of trend by least squares, moving average methods; Growth curves and their fitting- Modified exponential, Gompertz and Logistic curves.

Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods.

UNIT-II

INDEX NUMBERS: Concept, construction, uses and limitations of simple and weighted index numbers; Criteria of a good index numbers, Problems involved in the construction of index numbers; Fisher's index as ideal index number; Fixed and Chain base index numbers; Cost of living index numbers and Wholesale price index numbers; Concept of Base shifting, splicing and deflation of index numbers.

UNIT-III

VITAL STATISTICS: Introduction, Definition and uses of Vital Statistics; Sources of Vital Statistics; Registration and Census methods; Rates and Ratios; Crude Death Rates, Age Specific Death Rates, Standardized Death Rates, Crude Birth Rate, Age Specific Fertility Rate, General Fertility Rate, Total Fertility Rate; Measurement of Population Growth, Crude Rate of Natural Increase- Pearl's Vital index; Gross Reproductive Rates and Net Reproductive Rates; Life tables, construction and uses of life tables and Abridged life tables.

UNIT-IV

Official Statistics & Demand Analysis: Statistical systems in India; Functions and Organization of CSO and NSSO; Sources of Agricultural, Industrial, Forest Statistics; National Income and its determination. Theory of consumer behavior:- Utility function, Maximization of Utility Function, Indifference curves and their properties. Concept of Demand and Supply functions; Price Elasticity of Demand and Supply; Partial Elasticity of Demand; Engel's Law and Engel's Curve.

Paper-VIII: ECONOMETRICS & OPERATIONS RESEARCH

UNIT-I

ECONOMETRICS: Meaning and features of Econometrics; Scope of Econometrics; Concepts of Two variable and Three variable Linear models and their inference; Specification of general linear model and assumptions; Violation of assumption, OLS Estimation and BLUE estimation, Concepts of Heteroscedasticity, Multi collinearity and Autocorrelation; Sources and consequences.

UNIT-II

LINEAR PROGRAMMING: Meaning and scope of OR; Classification of OR models; Formulation of LPP; Solving LPP by graphic method and simplex method; Duality in LPP; Primal and Dual problems; Statement of Duality theorem; Concept of Dual Simplex method.

UNIT-III

TRANSPORTATION PROBLEM: Definition of transportation problem; TPP as special case of LPP; feasible solutions by North-West and Matrix minimum methods and Vogels's approximation method; Optimal solution through Modi method and stepping stone method for balanced and unbalanced transportation problem; Degeneracy in TP; Transshipment problem.

UNIT-IV

ASSIGNMENT AND SEQUENCING PROBLEMS: Formulation and description of Assignment problem and its variations; Assignment problem as special case of TP and LPP. Unbalanced assignment problem, travelling salesman problem; Optimal solution using Hungarian method; Problem of sequencing; Optimal sequence of n job on two and three machines without passing.

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**DEPARTMENT OF STATISTICS (w.e.f. 2017-2018)
(Modified Syllabus)**

Paper - V: Sampling Techniques and Design of Experiments

Unit –I

Sampling Theory: Principle steps in a sample survey, Censuses versus sample survey, sampling and Non-sampling errors. Types of sampling - subjective, probability and mixed sampling methods.

Simple Random Sampling: Meaning of Samples and methods to draw, estimation of population mean, variances in SRSWR & SRSWOR.

Unit –II

Stratified random sampling: Proportional and optimum allocation of sample sizes in stratification .Variances in these methods.

Systematic sampling : Systematic sampling when $N = nk$ comparison of their relative efficiencies. Advantages and Disadvantages of above methods of sampling.

Unit – III

Analysis of Variance:

Statement of GAUSS-MARKOFF theorem ,ANOVA model ,Statement of Cochran's theorem And application.

ANOVA technique-One way classification with equal and unequal number of observations;

Two way classification with single observation per cell ,concept of critical difference and its use. Concept of fixed ,random and mixed effect model.

Basic concepts in design of experiments, Principles of experimentation;

Unit – IV

Analysis & Design of experiments:

Analysis of Completely randomized Design(C.R.D) advantaged & disadvantages, its applications and Statistical analysis . Randomized Block Design(R.B.D), advantaged & disadvantages, its applications and Statistical analysis , Single missing plot technique in RBD.

Unit-V

Concept of Latin Square , Latin Square Design(L.S.D) lay out ,advantaged & disadvantages and Statistical analysis ,Single missing plot technique in LSD, Concept of efficiency of design,Comparison among CRD,RBD & LSD(with out derivation).

Analysis of 2^2 factorial design , 2^2 Main effects and interaction Effects

Text Books:

1. Telugu Academy BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

Reference Books:

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. Indian Official statistics - MR Saluja.
3. Anuvarthita Sankyaka Sastram - Telugu Academy.

Practicals Semester – V

Conduct any 6 (Ms -excel is compulsory)

1. Estimation of population Mean, variance by SRSWOR.
2. Estimation of population Mean, variance by SRSWR.
3. Comparison of proportional, optimum allocations with SRSWOR.
4. Systematic Sampling .
5. ANOVA-CRD.
6. ANOVA - RBD with one missing observation.
7. ANOVA - LSD with one missing observation.
8. Ms-excel practical

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DEPARTMENT OF STATISTICS (w.e.f. 2017-2018)
Paper :VI – QUALITY AND RELIABILITY

Unit – I

Statistical process control:

Importance of SQC in industry, Statistical basis of Shewart control charts, Construction of Control charts for variables (mean, range and standard deviation).

Unit – II

Statistical control charts for attributes:

p, np and c- charts with fixed and varying sample sizes. Interpretation of control charts, Natural tolerance limits and specification limits, process capability index. Concept of Six sigma and its importance.

Unit –III

Acceptance sampling plans:

Producers risk and consumer's risk. Concept of AQL and LTPD. Single and Double sampling plans for attributes and derivation of their OC and ASN functions. Design of single and double sampling plans for attributes using Binomial.

Unit-IV

Reliability: Introduction, meaning and concept of reliability, measures of reliability Failure density, mean failure rate, mean time to failure Mean time failure between failures failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memory less property.

Unit –V

Reliability Function and Estimation: Introduction Derivation of Reliability Function, Failure models Concepts of censoring and truncation.

System Reliability: Introduction, Types of systems System with series, parallel and k out of N systems and their reliabilities.

Text Books:

1. BA/BSc III year paper - IV Statistics - applied statistics - Telugu academy by Prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
2. Fundamentals of applied statistics : VK Kapoor and SC Gupta
3. S.K Sinha: Reliability and life testing. Wiley Eastern.

Reference Books :

- 1.. R.C.Gupta: Statistical Quality Control.

Practicals - Semester – V

Conduct any 6 (Ms -exel is compulsory)

- 1 Construction of (\bar{X} , R) charts.
2. Construction of P-chart-Fixed sample size.
3. Construction of P-chart-variable sample size
4. Construction of NP-Chart .

5. Construction of C-Chart.

6. MS-Excel methods for the Serial Numbers 1.

7. MS-Excel methods for the Serial Numbers 2 to 4 .

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DEPARTMENT OF STATISTICS (w.e.f. 2017-2018)
Paper :VII – Applied Statistics

UNIT-I

TIME SERIES: Time series and its components with illustrations; additive, multiplicative and mixed models; Determination of trend by least squares, moving average methods; Growth curves and their fitting- Modified exponential, Gompertz and Logistic curves.

Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods.

UNIT-II

INDEX NUMBERS: Concept, construction, uses and limitations of simple and weighted index numbers; Criteria of a good index numbers, Problems involved in the construction of index numbers; Fisher's index as ideal index number; Fixed and Chain base index numbers; Cost of living index numbers and Wholesale price index numbers; Concept of Base shifting, splicing and deflation of index numbers.

UNIT-III

Official Statistics: Statistical systems in India; Functions and Organization of CSO and NSSO; Sources of Agricultural, Industrial, Forest Statistics; National Income and its determination. Theory of consumer behavior:- Utility function, Maximization of Utility Function, Indifference curves and their properties

UNIT-IV

VITAL STATISTICS: Introduction, Definition and uses of Vital Statistics; Sources of Vital Statistics; Registration and Census methods; Rates and Ratios; Crude Death Rates, Age Specific Death Rates, Standardized Death Rates, Crude Birth Rate, Age Specific Fertility Rate, General Fertility Rate, Total Fertility Rate; Measurement of Population Growth, Crude Rate of Natural Increase- Pearl's Vital index; Gross Reproductive Rates and Net Reproductive Rates.

UNIT-V

Life tables: Basic definitions of Stationary Population, Stable population, Central mortality Rate, Force of Mortality, Life table Assumptions, construction of Life table and uses of life tables and simple problems.

Abridged life tables: Definition, Methods of Abridged life tables- Reed-Merrel Method, Greville's, King's.

Text Books:

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.

Reference Books:

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

Practicals - Semester – VI

Conduct any 6 (Ms-exel is compulsory)

1. Measurement of Linear Trend
2. Measurement of Seasonal Indices-Link Relatives method
3. Reversal tests.

4. Cost of living Index Numbers.
5. Mortality, Fertility & Re-production rates.
6. Life tables.
7. MS-Excel Practical.

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DEPARTMENT OF STATISTICS (w.e.f. 2017-2018)
Paper :VIII – OPERATION RESEARCH

Unit-I

Introduction to OR: Meaning and Origin ,scope of OR, Classification of OR models, Limitations of OR .LPP (Linear Programming Problem). Formulation of LPP, graphical method Solving LPP by using graphic method , Simple Problems.

Unit-II

LPP: General algorithm of LPP, Definition of LPP , IBFS, Basic and Non-basic variable, Slack variable, Surplus variable and Artificial variable Standard and canonical form of LPP. .Simplex method, Big M, two phase simplex methods and Simple Problems.

Unit - III

Duality in linear programming : Formulation of dual LPP, primal dual Important results in Duality (The dual of the dual is primal with proof and remaining theorems statements only) **Transportation problem :** Its definition, feasible solution by North-West corner rule, matrix minima VAM methods. Optimal solution through MODI for balanced and unbalanced transportation problem.

Unit-IV

Assignment problem: Meaning of assignment problem, unbalanced assignment problem, travelling salesman problem, Hungarian method for optimal solution.

Unit - V

Sequencing problem: Introduction , definition ,notations and terminology and Assumptions of Sequencing problem . Optimal sequencing of N Jobs on 2 and 3 machines without passing. Processing of n jobs through m machines.

Text Books:

- 1.Kanti swaroop, P.K.Guptha and Man Mohan: Operation Research. Sultan Chand.
2. BA/BSc III Year paper - IV Statistics - quality, reliability and operations Research - Telugu Academy by Dr T.C.Ravichandra Kumar, Dr R.V.S.Prasad, Dr D.Giri, Dr G.S.Devasena.
- 3.Operation Reach – S.D.Sharma.

List of reference books

- 1..S.K Sinha: Reliability and life testing. Wiley Eastern.

2. Operations research - Models and methods by Chandrasekar Salimath, Bhupendar Parashar.
3. Operation Research – Taha

Practicals - Semester –VI

Conduct any 6 Practical:

1. LPP - Graphic solution.
2. Simplex method.
3. Two phase simplex methods.
4. Transportation - NWCR. Matrix minima method. VAM for IBFS.
5. Assignment Problem (Balanced).
6. Unbalanced assignment problems.
7. Travelling salesman problems.
8. Sequencing problems- n jobs-2 machines sequencing problem.
9. n jobs-3 machine sequencing problem.

DEPARTMENT OF STATISTICS

Paper - V: Sampling Techniques and Design of Experiments

Unit –I

Sampling Theory: Principle steps in a sample survey, Censes versus sample survey, sampling and Non-sampling errors. Types of sampling - subjective, probability and mixed sampling methods.

Simple Random Sampling: Meaning of Samples and methods to draw, estimation of population mean, variances in SRSWR& SRSWOR.

Unit –II

Stratified random sampling: Proportional and optimum allocation of sample sizes in stratification .Variances in these methods.

Systematic sampling : Systematic sampling when $N = nk$ comparison of their relative efficiencies. Advantages and Disadvantages of above methods of sampling.

Unit – III

Analysis of Variance:

Statement of GAUSS-MARKOFF theorem ,ANOVA model ,Statement of Cochran's theorem And application.

ANOVA technique-One way classification with equal and unequal number of observations; Two way classification with single observation per cell ,concept of critical difference and its use. Concept of fixed ,random and mixed effect model.

Basic concepts in design of experiments, Principles of experimentation;

Unit – IV

Analysis & Design of experiments:

Analysis of Completely randomized Design(C.R.D) advantaged & disadvantages, its applications and Statistical analysis . Randomized Block Design(R.B.D), advantaged & disadvantages, its applications and Statistical analysis , Single missing plot technique in RBD.

Unit-V

Concept of Latin Square , Latin Square Design(L.S.D) lay out ,advantaged & disadvantages and Statistical analysis ,Single missing plot technique in LSD, Concept of efficiency of design,Comparison among CRD,RBD &LSD(with out derivation).

Analysis of 2^2 factorial design , 2^2 Main effects and interaction Effects

Text Books:

- 1.Telugu AcademyBA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

Reference Books:

- 1.Fundamentals of applied statistics : VK Kapoor and SC Gupta.
- 2.Indian Official statistics - MR Saluja.
- 3.Anuvarthita Sankyaka Sastram - Telugu Academy.

Conduct any 6 (Ms -excel is compulsory)

9. Estimation of population Mean, variance by SRSWOR.
10. Estimation of population Mean, variance by SRSWR.
11. Comparison of proportional, optimum allocations with SRSWOR.
12. Systematic Sampling .
13. ANOVA-CRD.
14. ANOVA - RBD with one missing observation.
15. ANOVA - LSD with one missing observation.
16. Ms-excel practical

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DEPARTMENT OF STATISTICS
Paper :VI – QUALITY AND RELIABILITY

Unit – I

Statistical process control:

Importance of SQC in industry, Statistical basis of Shewart control charts, Construction of Control charts for variables (mean, range and standard deviation).

Unit – II

Statistical control charts for attributes:

p, np and c- charts with fixed and varying sample sizes. Interpretation of control charts, Natural tolerance limits and specification limits, process capability index. Concept of Six sigma and its importance.

Unit –III

Acceptance sampling plans:

Producers risk and consumer's risk. Concept of AQL and LTPD. Single and Double sampling plans for attributes and derivation of their OC and ASN functions. Design of single and double sampling plans for attributes using Binomial.

Unit-IV

Reliability: Introduction, meaning and concept of reliability, measures of reliability Failure density, mean failure rate, mean time to failure Mean time failure between failures failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memory less property.

Unit –V

Reliability Function and Estimation: Introduction Derivation of Reliability Function, Failure models Concepts of censoring and truncation.

System Reliability: Introduction, Types of systems System with series, parallel and k out of N systems and their reliabilities.

Text Books:

1. BA/BSc III year paper - IV Statistics - applied statistics - Telugu academy by Prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
4. Fundamentals of applied statistics : VK Kapoor and SC Gupta
5. S.K Sinha: Reliability and life testing. Wiley Eastern.

Reference Books :

1.. R.C.Gupta: Statistical Quality Control.

Practicals - Semester – V

Conduct any 6 (Ms -excel is compulsory)

- 1 Construction of(\bar{X} ,R) charts.
2. Construction of P-chart-Fixed sample size.
4. Construction of P-chart-variable sample size 4. Construction of NP-Chart .
5. Construction of C-Chart.
6. MS-Excel methods for the Serial Numbers 1.
7. MS-Excel methods for the Serial Numbers 2 to 4 .

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Paper :VII – Applied Statistics**

UNIT-I

TIME SERIES: Time series and its components with illustrations; additive, multiplicative and mixed models; Determination of trend by least squares, moving average methods; Growth curves and their fitting- Modified exponential, Gompertz and Logistic curves.

Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods.

UNIT-II

INDEX NUMBERS: Concept, construction, uses and limitations of simple and weighted index numbers; Criteria of a good index numbers, Problems involved in the construction of index numbers; Fisher's index as ideal index number; Fixed and Chain base index numbers; Cost of living index numbers and Wholesale price index numbers; Concept of Base shifting, splicing and deflation of index numbers.

UNIT-III

Official Statistics: Statistical systems in India; Functions and Organization of CSO and NSSO; Sources of Agricultural, Industrial, Forest Statistics; National Income and its determination. Theory of consumer behavior:- Utility function, Maximization of Utility Function, Indifference curves and their properties

UNIT-IV

VITAL STATISTICS: Introduction, Definition and uses of Vital Statistics; Sources of Vital Statistics; Registration and Census methods; Rates and Ratios; Crude Death Rates, Age Specific Death Rates, Standardized Death Rates, Crude Birth Rate, Age Specific Fertility Rate, General Fertility Rate, Total Fertility Rate; Measurement of Population Growth, Crude Rate of Natural Increase- Pearl's Vital index; Gross Reproductive Rates and Net Reproductive Rates.

UNIT-V

Life tables: Basic definitions of Stationary Population , Stable population , Central mortality Rate , Force of Mortality, Life table Assumptions, construction of Life table and uses of life tables and simple problems.

Abridged life tables: Definition ,Methods of Abridged life tables- Reed-Merrel Method , Greville's , King's .

Text Books:

3. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
4. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.

Reference Books:

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

Practicals - Semester – VI

Conduct any 6 (MS-excel is compulsory)

1. Measurement of Linear Trend
2. Measurement of Seasonal Indices-Link Relatives method
3. Reversal tests.
4. Cost of living Index Numbers.
5. Mortality, Fertility & Re-production rates.
6. Life tables.
7. MS-Excel Practical.

(Modified syllabus)

DEPARTMENT OF STATISTICS (w.e.f. 2019-2020)

Paper :VII – Applied Statistics

UNIT-I

TIME SERIES: Time series and its components with illustrations; additive, multiplicative and mixed models; Determination of trend by least squares, moving average methods; Method of least square (Straight line and Second degree parabola only).

Measures of seasonal variations :simple average method , Ratio to moving average, ratio to trend and link relative methods.

UNIT-II

INDEX NUMBERS: Concept, construction, uses and limitations of simple and weighted index numbers; Criteria of a good index numbers, Problems involved in the construction of index numbers; Fisher's index as ideal index number; Fixed and Chain base index numbers; Cost of living index numbers and Wholesale price index numbers; Concept of Base shifting, splicing and deflation of index numbers.

UNIT-III

Official Statistics: Statistical systems in India; Functions and Organization of CSO and NSSO; Sources of Agricultural, Industrial, Forest Statistics; National Income and its determination. Theory of consumer behavior:- Utility function, Maximization of Utility Function, Indifference curves and their properties

UNIT-IV

VITAL STATISTICS: Introduction, Definition and uses of Vital Statistics; Sources of Vital Statistics; Registration and Census methods; Rates and Ratios; Crude Death Rates, Age Specific Death Rates, Standardized Death Rates, Crude Birth Rate, Age Specific Fertility Rate, General Fertility Rate, Total Fertility Rate; Measurement of Population Growth, Crude Rate of Natural Increase- Pearl's Vital index; Gross Reproductive Rates and Net Reproductive Rates.

UNIT-V

Life tables: Basic definitions of Stationary Population , Stable population , Central mortality Rate , Force of Mortality, Life table Assumptions, construction of Life table and uses of life tables and simple problems.

Abridged life tables: Definition ,Methods of Abridged life tables- Reed-Merrel Method , only .