

B.Sc I YEAR: STATISTICS SYLLABUS w.e.f. 2019-2020

I SEMESTER

PAPER – I Descriptive Statistics and Probability

Unit- I

Introduction to statistics : Origin, Development, Definition, Uses and Limitations (Nature and scope) of Statistics. Concepts of Primary and Secondary data. Methods of collection and editing of primary data. Designing a questionnaire and a schedule. Measures of Central Tendency – Mean, Median, Mode, Geometric Mean and Harmonic Mean.

Additional Input: Diagrammatic and Graphical presentation of data.

Unit- II

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

Unit- III

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

Unit - IV

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 – meaning, joint, marginal and conditional Distribution, independence of random variables.

Additional Topics are included only for basic Idea & Project work etc., so no question should be given from this part.

Reference Books (W.M.):

1. Introduction to probability – Charles M. Grinstead, J. Laurie Snell.
2. Fundamentals of Mathematical Statistics by VK Kapoor & S.C. Gupta
3. Fundamentals of Statistics – Goon Gupta, Das Gupta
4. Sambavyatha avadi Sidhantam – Telugu Academy
5. Hoog. Taims Rao: Probability and Statistical Inferences 7th edition Pearson.

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B.Sc., I YEAR: STATISTICS SYLLABUS w.e.f. 2019-2020

I SEMISTER Practicals

Practicals – Semester - I

1. Diagrammatic representation of data (Bar and Pie)
2. Graphical representation of data (Histogram, Frequency polygon, Frequency curves, Ogives)
3. Computation of Mean , Median , Mode
4. Central and Non central moments and Sheppard's corrections for moments.
5. Measures of Skewness and Kurtosis.
6. MS-Excel methods for the above Serial Numbers 1,2,4.

Note:

1. MS-Excel methods to be made mandatory for all the Semesters after proper training only to the teaching staff by the University concerned.

Reference Books (W.M.):

1. Introduction to probability – Charles M. Grinstead, J. Laurie Snell.
2. Fundamentals of Mathematical Statistics by VK Kapoor & S.C. Gupta
3. Fundamentals of Statistics – Goon Gupta, Das Gupta
4. Sambavyatha avadi Sidhantam – Telugu Academy
5. Hoog. Taims Rao: Probability and Statistical Inferences 7th edition Pearson.
6. 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. Vijaya Lakshmi

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II SEMESTER

PAPER – II Mathematical Expectation and Probability Distributions

Unit - I

Mathematical expectation :Mathematical expectation of a random variable and of a 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. Statements of properties. Chebyshev and Cauchy – Schwartz inequalities.

Unit – II

Discrete Distributions : Binomial, Poisson distributions, their definitions, it's to 4 central moments, M.G.F., C.G.F., P.G.F., C.F., reproductive property if exists. Poisson Approximation to Binomial and poison distributions.

Unit – III

Negative Binominal Distribution, Geometric, Hyper geometric, Rectangular, Exponential Distributions - Definitions, means, variances, M.G.F., C.G.F., P.G.F., C.F., reproductive property if exists. Binomial Approximation to Hyper Geometric distribution.

Additional Topic : Bernoulli distribution and its Moments

Unit – IV

Continuous Distributions: Gamma, Beta distributions of 2 kinds (means & variances only). Other Properties such as M.G.F., C.G.F., P.G.F., C.F., reproductive property if exists.

Normal Distribution: Definition, Importance, Properties, M.G.F., additive properties, Interrelation between Normal and Binomial. Poisson distribution. Cauchy Distribution – Definition, C.F. and additive property.

Reference Books (W.M.):

1. Introduction to probability – Charles M. Grinstead, J. Laurie Snell.
2. Fundamentals of Mathematical Statistics by VK Kapoor & S.C. Gupta
3. Fundamentals of Statistics – Goon Gupta, Das Gupta
4. Sambavyatha avadi Sidhantam – Telugu Academy
5. Hoog. Taims Rao: Probability and Statistical Inferences 7th edition Pearson.
6. 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. Vijaya Lakshmi

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B.Sc I YEAR: STATISTICS SYLLABUS w.e.f. 2019-2020

II SEMISTER Practical

Practical – Semester - II

1. Fitting of Binomial Distribution - Direct and Recurrence methods.
2. Fitting of Poisson Distribution – Direct and Recurrence methods.
3. Fitting of Negative Binomial Distribution.
4. Fitting of Geometric Distribution.
5. Fitting of Normal Distribution – Areas and Ordinates methods.
6. MS-Excel methods for the above Serial Numbers 1 and 2.

Reference Books (W.M.):

1. Introduction to probability – Charles M. Grinstead, J. Laurie Snell.
2. Fundamentals of Mathematical Statistics by VK Kapoor & S.C. Gupta
3. Fundamentals of Statistics – Goon Gupta, Das Gupta
4. Sambavyatha avadi Sidhantam – Telugu Academy
5. Hoog. Taims Rao: Probability and Statistical Inferences 7th edition Pearson.
6. 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. Vijaya Lakshmi

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BSC II YEAR : STATISTICS SYLLABUS
Semester - III CBCS

Paper - III Statistical Methods
w.e.f.2019-2020

Unit-I

Correlation: Def., & its coefficient and its properties. scatter diagram, computation of correlation coefficient for ungrouped data. spearman's rank correlation coefficient, properties of spearman's correlation coefficients and problems.

Additional Input: Probable error.

Unit-II

Regression: simple linear regression, properties of regression coefficients. Regression lines, Concept of Correlation ratio, partial and multiple correlation coefficients, correlation verses regression and their problems .

Curve fitting : principles of Least squares, Method of least square - Fitting of linear, quadratic, Exponential and power curves and their problems

Additional Input: Method of studying regression.

Unit-III

Attributes: Introduction, Nature, and consistency and mention its conditions. Independence and association of attributes, co-efficient of association, coefficients of contingency and their problems.

Unit -IV

Exact sampling distributions: Concept of population, Parameter, random sample, Need of taking sample, concept of sampling, Sample Vs. Census statistic, sampling distribution, standard error. Statement and Properties of χ^2 , t, F distributions and their inter relationships.

Additional Topics are included only for basic Idea & Project work etc., so no question should be given form this part.

Text books

1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A. Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. Ravichandra Kum.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. Fundamentals of Mathematics statistics: VK Kapoor and SC Guptha.

Reference Books:

1. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das Guptha B.
2. Introduction to Mathematical Statistics : Hoel P.G.

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STATISTICS METHODS
PRACTICAL SEMESTER – III
(w.e.f.2019-2020)

Conduct any 6 (Ms-exel is compulsory)

1. Fitting of straight line.
 2. Fitting of exponential curves.
 3. Fitting of power curve.
 4. Computation of correlation coefficient & Fitting of Regression lines.
 5. Rank correlation coefficient.
 6. Computation of Contingency coefficients.
- MS-Excel methods any for the Serial Numbers 1,2,4,5

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BSC II YEAR : STATISTICS SYLLABUS
Semester - IV
Paper - IV : Statistical Inference
(w.e.f.2019-2020)

UNIT-I

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

Additional Input: Crammerrao Inequality theorem

UNIT II

Concepts of Statistical hypothesis: Null and alternative hypothesis, critical region, two types of errors, level of significance, power of a test. 1 tailed, 2 tailed tests, Neyman - Pearson's lemma. Examples in of Binomial. Poisson, Normal distributions.

UNIT -III

Large Sample Tests : Large sample tests for single mean, two means, Single proportion, Two proportions, Standard Deviation of single and double samples and Fisher's Z transformation .

UNIT -IV

Small sample tests: Tests of significance based on χ^2 , t and F. χ^2 -test for independence of attributes, t-test for single, double and paired tests, Variance Ratio Test(F-test), Equality of Means Test, Non-parametric tests - Advantages and Disadvantages. Two sample run test, two sample Median test and Two sample sign test.

Additional Input : χ^2 test for Goodness of fit.

TEXT BOOKS

1. BA/BSc II year statistics - statistical methods and inference
- Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr
R.Sudhakar Reddy, Dr T.C. Ravichandra Kumar.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC.
PHI.

REFERENCE BOOKS:

1. Fundamentals of Mathematics statistics : VK Kapoor and
SC Guptha.
2. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha,
Das Guptha B.
3. Introduction to Mathematical Statistics : Hoel P.G.

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Semester - IV

Paper - IV : Statistical Inference

Practicals Semester – IV

(w.e.f.2019-2020)

Conduct any 6 (Ms-exel is compulsory)

1. Large sample tests for mean(s).
2. Large sample tests for proportion(s).
3. Large sample tests for standard deviation(s).
4. Large sample tests for Fisher's Z- transformation.
5. Small sample tests for Single and Doublet-test.
6. Small sample tests for Paired t-test.
7. F-Test.
8. Chi square test for independence of attributes.
9. Non-parametric testst – run test.
10. Non-parametric tests - median test.
- 11 Non-parametric tests - sign tests.
12. MS-Excel methods for the above Serial Numbers
1,2,3,4.(any one of above)

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III B.Sc., STATISTICS SYLLABUS (w.e.f.2017-18)
Semester-V

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.

Unit-II

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

Unit-III

Stratified Random sampling: Proportional and optimum allocation of sample sizes in stratification. Variances of these methods. Comparison of their relative efficiencies. Advantages and Disadvantages of stratified sampling. Concept of systematic sampling Advantages and disadvantages.

Unit-IV

Analysis of Variance: Causes of variation, Statement of Cochran's theorem, One-way with equal and unequal classifications and two way classifications.

Design of Experiments: Principles of experimentation in Designs, analysis of completely randomised design (CRD), Randomised block design (RBD) and Latin square design (LSD), efficiency of these designs. Concept of Factorial experiments.

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.
- 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. Anuvarthita Sankhyaka Sastram - Telugu Academy.

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III B.Sc., : STATISTICS PRACTICAL SYLLABUS (w.e.f.2017-18)
Semester-V**

Paper - V : Sampling Techniques and Design of Experiments

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. ANOVA One -way classification.
4. ANOVA-CRD.
5. ANOVA - RBD.
6. ANOVA - LSD.
7. Ms-excel methods for the above serial numbers 4,5,6(any one)

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**III B.Sc., : STATISTICS SYLLABUS (w.e.f.2017-18)
Semester-V**

Paper - VI : Quality and Reliability

Unit-I Importance of SQC in industry, statistical basis of shewart control charts, uses of control charts., control limits, Natural tolerance limits and specification limits. concept of six-sigma

Unit - II

Variable Control Chart: Construction of mean , R ,s.d, charts for variables, Interpretation of control charts

Attribute control charts- nP, P charts, C chart, Interpretation of control charts.

Unit-III

Acceptance sampling plans: Scope, Producer's risk and consumer's risk . Concept of AQL and LTPD.

Unit-IV

Sampling Plans: Single and double sampling plans, OC and ASN functions, Double and single Sampling plans for attributes using Binomial.

Unit-V Reliability: Introduction, failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memoryless property.

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

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

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**III B.Sc., : STATISTICS PRACTICAL SYLLABUS (w.e.f.2017-18)
Semester-V**

Paper - VI : Quality and Reliability

Practical's - Semester - V Conduct any 6 (Ms-excel is compulsory)

1.Construction of(mean ,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.(any one)

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III B.Sc., Degree Examination (at the end of VI Semester)
STATISTICS SYLLABUS
Semester – VI CBCS
Paper – Elective: Optimization Techniques**

Unit –I

Operations Research: Origin and development of O.R., Nature and features of O.R., Scientific method and Modeling in O.R., Advantages and limitations of models, General solution methods for O.R., models.

Unit –II

Linear Programming Problem: Definition, components, basic assumptions, Mathematical formulation of the problem, Illustrations on mathematical formulation of L.P.P. L.P.P. –graphical solution method, some exceptional cases in graphical method-Alternative optima, unbounded solution and infeasible solution.

Unit –III

Linear Programming Problem-Simplex Method-I : General L.P.P. –Objective function, constraints, non-negative restrictions, Solution of L.P.P, feasible solution and optimum solution, Canonical and Standard forms of L.P.P., Basic solution- definition, degenerate solution, basic feasible solution, Associated cost vector, improved basic feasible solution, optimum basic feasible solution and net evaluation, Fundamental theorem of L.P.P, The computational procedure- Simplex Algorithm, Simple linear programming problems.

Unit –IV

Linear Programming Problem Simplex Method –II: Artificial Variable Technique, The Big M Method or Penalties, Degeneracy, Alternative optima, unbounded solutions, Nonexisting or infeasible solutions.

Duality in Linear Programming: General primal – Dual pair, formulating a dual problem, Primal-Dual Pair in Matrix form, Duality

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III B.Sc., Degree Examination (at the end of VI Semester)
STATISTICS SYLLABUS
Semester – VI
Paper –(Cluster – 1) Operations Research –I**

Unit –I

Linear Programming Problem – Advanced Techniques: Revised Simplex Method –Algorithm, Simple Problems (2 and 3 variables), Simplex method versus revised simplex method, Bounded Variables- Computational procedure, Simple problems (2 and 3 variables).

Unit –II

Transportation Problem: L.P. formulation of the Transportation problem, Tabular Representation, Initial Basic Feasible Solution (I.B.F.S) to transportation Problem, North west Corner, least cost and Vogles approximation Methods.

Transportation Problem: The Optimality Test – Transportation Algorithm – MODI (Modified Distribution Method), Degeneracy Transportation Problem.

Unit –III

Assignment Problem: Mathematical Formulation of the problem, Hungarian method for assignment problem, Special cases in Assignment problems – Unbalanced, Prohibited, Maximization. Travelling Salesman Problem.

Unit –IV

Sequencing Problem:

Problem of Sequencing, Principal Assumptions, Solution of Sequencing, Problem – Processing n jobs through 2-Machines and Processing n jobs through 3-Machines-Johnson's Optimal sequence Algorithm, Processing n jobs through k -Machines – Johnson's Optimal sequences Algorithm, Simple Problems.

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**IIIB.Sc., Degree Examination (at the end of VI Semester)
STATISTICS SYLLABUS**

Cluster -2: Operations Research – II

Unit -I

Games and Strategies: Introduction, Two person zero sum games, some basic terms, the Maxima-Minima Principle, Games without saddle points – Mixed strategies, Graphical Solutions of $2 \times n$ and $m \times 2$ Games, Dominance property.

Unit -II

Inventory Control – I: Basic concept of inventory problem, Types of inventories and Cost associated with inventories, Factors affecting inventory control, the concept of EOQ (Economic Order Quantity), Deterministic inventory Problems (Static Demand Model).

Unit -III

Inventory Control – II: Price Breaks (Quantity Discounts): Problems of EOQ with – One price break and More than one price break, Simple problems, Probabilistic inventory models, Instantaneous demand, No setup cost model – Discrete case and Continuous case, Newspaper Boy Problem, Simple Problem.

Unit -IV

Network Scheduling – I: Basic steps in PERT/CPM technique Basic components, Logical sequencing (errors in drawing networks), Rules for network construction, Critical path analysis – Forward pass Method Backward pass Method, Determination of floats and slack times, Simple problems.

Network Scheduling – II: Probability considerations in PERT (Project Evaluation and Review Technique), Distinction between PERT and CPM, Applications of network techniques, Limitations and difficulties in using Network, Project Cost, Time Cost optimization algorithm, Simple Problems.