GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

BEGUMPET, HYDERABAD-16

Affiliated To Osmania University, Re-Accredited With 'B^{+}' Grade by NAAC

DEPARTMENT OF STATISTICS

SYLLABUS (2018-19)

B.Sc Statistics Semester- I Syllabus
(With Mathematics Combination)
With effect from Academic Year – 2018-19

Paper- I: <mark>Descriptive Statistics and Probability</mark>

COURSE CODE:STAT101

Course Outcome:
Descriptive Statistics:

After completing this course, the students should have developed a clear understanding about :

- The Concepts of statistical population and sample, variables and attributes.
- Tabular and graphical representation of data based on variables.
- Measures of central tendency, Dispersion, Skewness and Kurtosis.
- Moments and their use in studying various characteristics of data.
- Different approaches to the theory of probability.
- Important theorems on probability and their use in solving problem.
- The concept of random variables and distribution function. Probability mass and density functions.
- To understand and interpret the expected value and variance of a random variable and various properties of expectation and variance.

Unit –I
<mark>Descriptive Statistics:</mark> Concept of primary and secondary data, Methods of collection and editing of primary data. Designing a questionnaire and a schedule. Sources and editing of secondary data. Classification and tabulation of data. Measures of central tendency and measures of dispersion with simple applications. Moments:- Importance, central and non-central moments, and their interrelationships, Sheppard's corrections. Skewness and Kurtosis and their measures with real life examples.

Unit –II
<mark>Probability:</mark> Basic concepts in probability—deterministic and random experiments, trail, outcome, sample space, event, and operations of events, mutually exclusive and exhaustive events, and equally likely and favorable outcomes with examples. Mathematical, statistical and axiomatic definitions of probability with limitations. Properties of probability based on axiomatic definition. Conditional probability and independence of events. Addition and multiplication theorems for n events. Boole's inequality and Bayes' theorem. Problems on probability using counting methods and theorems**.**

Unit-III
<mark>Random Variables:</mark> Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties. Transformation of one-dimensional random variable (simple 1-1 functions only). Notion of bivariate random variable, bivariate distribution and statement of its properties. Joint, marginal and conditional distributions. Independence of random variables**.**

Unit –IV

Mathematical Expectation: Mathematical expectation of a function of a random variable. Raw and central moments and covariance using mathematical expectation with examples.

Addition and multiplication theorems of expectation. Definition of moment generating function (m.g.f), cumalant generating function (c.g.f), probability generating function (p.g.f) and characteristic function (c.f) and statements of their properties with applications. Chebyshev's , and Cauchy-Schwartz's inequalities and their applications.

List of reference books:

1**.**Charles M.Grinstead and Laurie Snell,J:Introduction to Probability,American Mathematical Society

2.Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley

3.V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi

4. GoonAM,GuptaMK,Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolakota.

5. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.

6. M.JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.

7. Sanjay Arora and BansiLal:.New Mathematical Statistics : Satya Prakashan , New Delhi

8. Hogg.Tanis.Rao: Probability and Statistical Inference. 7th edition. Pearson

9. SambhavyataAvadhiSiddantalu—TeluguAcademy

10. Sahasambandham-VibhajanaSiddantamulu – TeluguAcademy

11. K.V.S. Sarma: Statistics Made Simple: do it yourself on PC. PHI

12. Gerald Keller: Applied Statistics with Microsoft excel. Duxbury, Thomson Learning.

13. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel 4th edition. Pearson Publication.

14. Abraham Kendall and Baker: Discrete Mathematics for Computer Science.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc I Year Statistics Semester- I
(With Mathematics Combination)
(Examination at the end of Semester I)
With effect from Academic Year – 2018-19
Practical Paper- I (with 3 HPW, Credits 1 and marks 50)

1. Basic of Excel- data entry, editing and saving, establishing and copying formulae, built in Functions in excel, copy and paste and exporting to MS- word document. (Not for the examinations).
2. Graphical presentation of data (Histogram, frequency polygon, Ogives).
3. Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS- Excel.
4. Diagrammatic presentation of data (Bar and pie).
5. Diagrammatic presentation of data (Bar and pie) using MS- Excel.
6. Computation of non- central and central moments- Sheppard's corrections for grouped data.
7. Computation of coefficients of Skewness and Kurtosis- Karl Pearson's and Bowley's β_1 and β_2.
8. Computation of Measures of central tendency, dispersion, Coefficient of variation and coefficient of Skewness, Kurtosis using MS- Excel.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc I Year Statistics Semester- II Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-19
Paper- II: PROBABILITY DISTRIBUTIONS
(4 HPW with 4 Credits and 100 Marks)

COURSE CODE:STAT201

Course Outcome:

- P.m.f and p.d.f of various discrete and continuous probability distributions
- Application of probability distributions to a variety of problems in diversified fields.

Unit –I

Discrete distributions – I **:** Uniform and Bernoulli distributions : definitions, mean, variance and simple examples. Definition and derivation of probability function of Binomial distribution, Poisson distribution definition, properties of these distributions such as median, mode, m.g.f, c.g.f., p.g.f., c.f., and moments up to fourth order, reproductive property, wherever exists, and their real life applications. Poisson approximation to Binomial distribution.

Unit –II

Discrete distributions – II**:** Negative binomial, Geometric distributions: Definitions and physical condition, properties of these distributions such as m.g.f, c.g.f., p.g.f., c.f. and moments upto fourth order, reproductive property, wherever exists, lack of memory property for Geometric distribution and their real life applications. Poisson approximation to Negative binomial distribution. Hyper-geometric distribution – definition, physical conditions, derivation of probability function, mean, variance and real life applications. Binomial approximation to Hyper-geometric.

Unit-III

Continuous distributions – I: Rectangular and Normal distributions – definition, properties such as m.g.f., c.g.f., c.f. and moments up to fourth order, reproductive property, wherever exists and their real life applications. Normal distribution as a limiting case of Binomial and Poisson distributions.

Unit –IV

Continuous distributions – II : Exponential, Gamma : definition, properties such as m.g.f., c.g.f., c.f. and moments up to fourth order, reproductive property wherever exists and their real life applications. Beta distribution of two kinds : Definitions, mean and variance. Cauchy distribution - Definition and c.f.

Definition of convergence in Law, in probability and with probability one or almost sure convergence. Definition of Weak Law of Large Numbers (WLLN) and Strong Law of Large numbers (SLLN). Definition of Central Limit Theorem (CLT) for identically and independently distributed (i.i.d) random variables with finite variance.

List of reference books:

1. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley
2. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
3. GoonAM,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 BansiLal:.New Mathematical Statistics : Satya Prakashan , New Delhi
7. Hogg.Tanis.Rao: Probability and Statistical Inference. 7th edition. Pearson
8. SambhavyataAvadhiSiddantalu—TeluguAcademy
9. Sahasambandham-VibhajanaSiddantamulu – TeluguAcademy
10. K.V.S. Sarma: Statistics Made Simple: do it yourself on PC. PHI
11. Gerald Keller: Applied Statistics with Microsoft excel. Duxbury, Thomson Learning.
12. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel 4th edition. Pearson Publication.
13. Abraham Kendall and Baker: Discrete Mathematics for Computer Science.
14. Charles M.Grinstead and Laurie Snell,J:Introduction to Probability,American Mathematical Society

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS BEGUMPET, HYDERABAD- 500016
B.Sc I Year Statistics Semester- II
(With Mathematics Combination)
(Examination at the end of Semester I)
With effect from Academic Year – 2018-19
Practical Paper- II (with 3 HPW, Credits 1 and marks 50)

1.   Fitting of Binomial distribution- Direct method.
2.   Fitting of Binomial distribution- Direct method using MS Excel.
3.   Fitting of Binomial distribution- Recurrence relation method.
4.   Fitting of Poisson distribution- Direct method.
5.   Fitting of Poisson distribution- Direct method using MS Excel.
6.   Fitting of Poisson distribution- Recurrence relation method.
7.   Fitting of Negative Binomial distribution.
8.   Fitting of Geometric distribution.
9.   Fitting of Normal distribution- Areas method.
10.   Fitting of Normal distribution- Ordinates method.
11.   Fitting of Exponential distribution.
12.   Fitting of Exponential distribution using MS Excel.
13.   Fitting of a Cauchy distribution.
14.   Fitting of a Cauchy distribution using MS Excel.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD
Model Question Paper for B.Sc I Year, semester I &II
Subject: Statistics

Time: 2 ½ hrs   **Max. Marks: 60**

SECTION- A

Note: Answer any 5 of the following.   **5 x 4 = 20 Marks**

1.   Unit- I
2.   Unit- I
3.   Unit- II
4.   Unit-II
5.   Unit-III
6.   Unit-III
7.   Unit- IV
8.   Unit- IV

SECTION- B

Note: Answer all the questions.   **4 x 10 = 40**

9.   a) Unit- I
(or)
    b) Unit- I

10.   a) Unit- II
 (or)
    b) Unit-II

11.   a) Unit- III
(or)
    b) Unit-III
12.   a) Unit- IV
(or)
    b) Unit- IV

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD
Pattern of examination

The scheme of examination has been changed from 25 marks internal and 75 marks external to 40 marks for internal and 60 marks for external examination.

Division of 40 marks is as follows.

1.   20 marks internal assessment in the form of descriptive exam, where two internals will be conducted and average of two is considered.

2.   Unit wise test in the form of 20 objective questions, half mark each and a total value of 10 marks.

3.   5 marks for Seminar/ Quiz/ group discussion and 5 marks for assignments.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD
B.Sc I Year Practical Model Question Paper
Subject: Statistics

Time: 3 hrs   **Max. Marks: 45+5=50**

Note: Answer any Two questions in Section- A and One question in Section- B. Each question carries equal marks.

SECTION- A (Using Calculators)

1.
2.
3.

SECTION- B (Using MS- Excel)

1.
2.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics Semester- III Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
Paper- III: Statistical Methods and Theory of Estimation
(4 HPW with 4 credits and 100 marks)

COURSE CODE:STAT301

Course Outcome:

- Learn about the properties of correlation and regression.
- Use of Regression analysis for estimation and prediction purpose.
- To understand the various methods of estimation.

Unit –I

Bivariate data, scattered diagram, Principle of least squares, Fitting of straight line, second degree parabola, quadratic and power curves. Concepts of correlation, computation of Karl Pearson correlation coefficient for grouped and ungrouped data and properties.
Correlation ratio, Spearman's rank correlation coefficient and its properties. Simple linear regression, correlation verses regression, properties of regression coefficients.

Unit –II

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

Unit – III

Concepts of population, parameter, random sample, statistic, sampling distribution and standard error.Standard error of sample mean(s) and sample proportion(s). Exact sampling distributions- Statement and properties of χ^2, t and F distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.
Point estimation of a parameter, concept of bias and meansquare error of an estimate. Criteria of good estimator- consistency, unbiasedness, efficiency and sufficiency with examples.

Unit – IV

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

List of Reference Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd.,Kolakota.
3. Hoel P.G: Introduction to matehematical statistics, Asia Publiushing house.
4 .Sanjay Arora and BansiLal:.New Mathematical Statistics SatyaPrakashan , New Delhi
5.Hogg and Craig   :Introduction to Mathematical statistics. Prentice Hall
6.Siegal,S.,and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
7GibbonsJ.D and SubhabrataChakraborti: Nonparametric Statistical Inference. Marcel Dekker.
8.ParimalMukhopadhyay: Mathematical Statistics. New Central Book agency.
9.Conover : Practical Nonparametric Statistics. Wiley series.
10.V.K.Rohatgi and A.K.Md.EhsanesSaleh: An introduction to probability and statistics. Wiley series.
11.MoodAM,GraybillFA,Boe's DC. Introduction to theory of statistics. TMH
12. Paramiteyamariyuaparameteyaparikshalu. Telugu Academy.
13.K.V.S. Sarma: Statistics Made simple do it yourself on PC.   PHI
14.Gerald Keller: Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
15.Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th edition. Pearson Publication.
16.Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
17.Milton and Arnold(fourth Edition):Introduction to Probability and statistics,Tata Mcgraw hill Publication.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc II Year Statistics Semester- III
(With Mathematics Combination)
(Examination at the end of Semester III)
Practical Paper- III (with 2 HPW, Credits 1 and marks 25)

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

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics Semester- IV Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-19
Paper- IV: Testing of Hypothesis
(4 HPW with 4 credits and 100 marks)

COURSE CODE:STAT401

Course Outcome:

●   To understand the concept of sampling distributions and their applications in statistical inference.
●   To understand the process of hypothesis testing and its significance
●   Importance of Standard Error and to draw conclusions using p-value

Unit –I

Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests, test function (non-randomized and randomized).Neyman-Pearson's fundamental lemma for Randomized tests.Examples in case of Binomial, Poisson, Exponential and Normal distributions and their powers.

Unit II

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

Unit – III

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

Unit – IV

Non-parametric tests- their advantages and disadvantages, comparison with parametric tests.Measurement scale- nominal, ordinal, interval and ratio. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolfowitz's runs test. Use of central limit theorem in testing.

List of Reference Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd.,Kolakota.
3. Hoel P.G: Introduction to matehematical statistics, Asia Publiushing house.
4 .Sanjay Arora and BansiLal:.New Mathematical Statistics SatyaPrakashan , New Delhi
5.Hogg and Craig   :Introduction to Mathematical statistics. Prentice Hall
6.Siegal,S.,and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
7GibbonsJ.D and SubhabrataChakraborti: Nonparametric Statistical Inference. Marcel Dekker.
8.ParimalMukhopadhyay: Mathematical Statistics. New Central Book agency.
9.Conover : Practical Nonparametric Statistics. Wiley series.
10.V.K.Rohatgi and A.K.Md.EhsanesSaleh: An introduction to probability and statistics. Wiley series.
11.MoodAM,GraybillFA,Boe's DC. Introduction to theory of statistics. TMH
12. Paramiteyamariyuaparameteyaparikshalu. Telugu Academy.
13.K.V.S. Sarma: Statistics Made simple do it yourself on PC.   PHI
14.Gerald Keller: Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
15.Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th edition. Pearson Publication.
16.Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
17.Milton and Arnold(fourth Edition):Introduction to Probability and statistics,Tata Mcgraw hill Publication.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc II Year Statistics Semester- IV
(With Mathematics Combination)
(Examination at the end of Semester IV)
Practical Paper- IV (with 2 HPW, Credits 1 and marks 25)

1.   Large sample tests for mean(s), proportion(s), Standard deviation(s) and correlation coefficient.
2.   Small sample tests for single mean and difference of means and correlation coefficient.
3.   Paired t-test.
4.   **Small sample tests for mean(s), paired t-test and correlation coefficient using MS Excel.**
5.   Small sample test for single and difference of variances.
6.   **Small sample test for single and difference of variances using MS Excel.**
7. χ^2 – test for goodness of fit and independence of attributes.
8.   **χ^2 – test for goodness of fit and independence of attributes using MS Excel.**
9.   **Nonparametric tests for single and related samples (sign test and Wilcoxon signed rank test) and one sample runs test.**
10.   Nonparametric tests for two independent samples (Median test, Wilcoxon Mann Whitney - U test, Wald - Wolfowitz's runs test)

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) BEGUMPET, HYDERABAD
Model Question Paper for B.Sc II Year, semester III& IV
Subject: Statistics
Paper: III &IV

Time: 2 ½ hrs   **Max. Marks: 75**

SECTION- A
Note: Answer any Five of the following. Each question carries 3 marks. 5 x 3 = 15 Marks

1.   UNIT-I
2.   UNIT-I
3.   UNIT-II
4.   UNIT-II
5.   UNIT-III
6.   UNIT-III
7.   UNIT-IV
8.   UNIT-IV

SECTION- B

Note: Answer all questions.   4 x 15 = 60 Marks

9.   a) UNIT-I
(or)
b) UNIT-I
10.   a) UNIT-II
(or)
b) UNIT-II
11.   a) UNIT-III
(or)
b) UNIT-III
12.   a) UNIT-IV
(or)
b)UNIT-IV

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics II Year Semester- III Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
SEC-1: Concepts of Sequences of Random Variables
(2 HPW with 2 Credits and 50 Marks)

COURSE CODE:STAT101

UNIT-I

Stochastic process, Index set, state space, classification of stochastic process with examples, stationary process, Covariance stationary process, Martingale sequence of random variables. Applications of stochastic process through examples.

UNIT-II
Definition and examples of finite- dimensional distributions of Markov Chain, time-homogeneity, transition probability matrix, marginal distribution. Classification of states-recurrent, transient, positive recurrent and null recurrent states.

Reference Books:

1.   Medhi, J. (1982): Stochastic Processes, Wiley Eastern.
2.   U.N. Bhat (1984): Elements of Applied Stochastic Processes, Wiley series.

B.Sc Statistics II Year Semester- IV Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
SEC-2: Statistics for Psychology and Education
(2 HPW with 2 Credits and 50 Marks)

COURSE CODE:STAT101

UNIT-I

Introduction, scaling procedures, scaling of rankings interms of Normal probability curves.

UNIT-II

Reliability of test scores, effect of test length and different ranges on reliability of the test, Validity of test scores, comparison between reliability and validity.

Reference Books:

Fundamentals of Applied Statistics by S.C. Gupta and V.K.Kapoor, Sultan Chand & Sons

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016

MODEL QUESTION PAPER FOR SEC –1, 2, 3& 4

Time : 1 ½ hr   **Max. Mar: 40**

SECTION-A

Note: Answer any Four of the following questions. Each question carries 4 marks 4 x 4= 16

1.   Unit-I
2.   Unit-I
3.   Unit-I
4.   Unit-II
5.   Unit-II
6.   Unit-II

SECTION-B

Note: Answer the following question.   **2 x 12= 24 Marks**

1.   a) Unit-I
(or)
b) Unit-I
   2. a) Unit- II
      (or)
      b) Unit- II

Note: Internal is for 10 Marks

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Paper V- Sampling Theory, Time series and Demand Analysis
(3 Hours Per Week with 3 Credits)

COURSE CODE:STAT501

Course Outcome:

- Identify and describe common methods of sampling
- To understand the factors to be considered while selecting a sample.
- Recognize the forecasting methods available for time series with specific components.

UNIT-I

Sample Surveys: Concepts of population, sample, sampling unit, parameter, statistic, sample frame and standard error. Principal steps in sample surveys - need for sampling, census versus sample surveys, sampling and non- sampling errors, sources and treatment of non-sampling errors, advantages and limitations of sampling.

Sampling Methods: Types of sampling: Subjective, probability and mixed sampling methods. Methods of drawing random samples with and without replacement. Estimates of population mean, total, and proportion, their variances and the estimates of variances in Simple Random Sampling With and Without Replacement

UNIT-II

Estimates of population mean, total, and proportion, their variances and the estimates of variances in the following methods.
(i) Stratified Random Sampling with Proportional and Neyman allocation, and
(ii) Systematic Sampling when N= nk.
Comparison of relative efficiencies. Advantages and disadvantages of SRS, Stratified and Systematic sampling methods.

UNIT-III

Time series: Time series and its components with illustrations, additive, multiplicative and mixed models. Determination of trend by least squares and moving average methods. Growth curves and their fitting with reference to Modified exponential, Gompertz and Logistic curves. Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods.

UNIT-IV

Demand Analysis: Introduction. Demand and supply, price elasticity of supply and demand. Methods of determining demand and supply curves, Leontief's ,Pigous's methods of determining demand curve from time series data, limitations of these methods Pigou's method from time series data. Pareto law of income distribution curves of concentration.

Reference Books:

1. V.K. Kapoor and S.C. Gupta : Fundamentals of Applied Statistics. Sultan Chand
2. Parimal Mukhopadhyay : Applied Statistics, New Central Book agency.
3. Daroga Singh and Chowdhary: Theory and Analysis of Sample survey designs. Wiley Eastern.
4. M.R.Saluja : Indian Official Statistics. ISI publications.
5. B.L.Agarwal: Basic Statistics.New Age publications.
6. S.P.Gupta : Statistical Methods. Sultan Chand and Sons.
7. Anuvartita Sankhyaka Sastram – Telugu Academy.
8. Arora, SumeetArora,S.Arora: Comprehensive Statistical Methods. S.Chand.
9. A.M.Goon, M.K.Gupta, B. Dasgupta: Fundamentals of Statistics Vol II World Press Private Ltd.,Calcutta
10. A.M.Goon,M.K.Gupta,B.Dasgupta An outline of Statistical Theory Vol II World Press Private
Ltd.,Calcutta17.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Paper- VI: Statistical Quality Control , Reliability &Index numbers
(3 Hours Per Week with 3 Credits)

COURSE CODE:STAT601

Course Outcome:

- Understand the role of statistical tools in quality improvement and how a control chart is used to detect assignable causes.
- Construct and interpret control charts for variables and attributes.
- Interpret and use a range of index numbers commonly used in the business sector
- To Perform calculations involving simple, composite and weighted index numbers

UNIT –I
Statistical Quality Control: Importance of SQC in industry. Dimensions of quality, Statistical basis of Shewart control charts. Construction of control charts for variables (mean, range and standard deviation) and attributes (p , np with fixed and varying sample sizes) and their Interpretation.

UNIT –II
Control charts for attributes (c and u charts with fixed and varying sample sizes) and their Interpretation. Construction of control charts for Natural tolerance limits and specification limits, process capability index and modified control charts.

UNIT –III

Acceptance sampling plans:. Concept of AQL and LTPD. Producers risk and consumer's risk Single and Double sampling plans for attributes and their OC and ASN functions. Design of single and double sampling plans for attributes using Binomial and Poisson distributions. Construction of OC and ASN functions.
Reliability: Introduction. Hazard function, Exponential distribution as life model, its memory-less property. Reliability function and its estimation. System reliability - series, parallel and k out of N systems and their reliabilities with simple examples.

UNIT –IV

Index Numbers: Concept, construction, uses and limitations of simple and weighted index numbers. Laspeyer's, Paasche's and Fisher's index numbers, criterion of a good index numbers, problems involved in the construction of index numbers. Fisher's index as an ideal index number. Fixed and chain base index numbers. Cost of living index numbers and wholesale price index numbers. Base shifting, splicing and deflation of index numbers.

Reference Books:

1. D.C. Montgomary: Introduction to Statistical Quality Control. Wiley
2. V.K. Kapoor and S.C.Gupta L Fundamentals of Applied Statistics. Sultan Chand
3. Parimal Mukhopadhyay : Applied Statistics . New Central Book agency
4. Anuvartita Sankhyakasastram – Telugu Academy.
5. R.C.Gupta: Statistical Quality Control.
6. S.K.Sinha: Reliability and life testing. Wiley Eastern
7. L.S.Srinath: Reliability Engineering. Affiliated East-West Press

GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD- 500016
B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Practical Paper-V: Theory Paper V and VI
(with 2 HPW, 1 Credit)

SECTION – A

Estimation of population mean, population total and variance of these estimates by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR
3. Systematic sampling with $N = nk$. Comparison of Systematic sampling with Stratified and SRSWOR
4. Measurement of trend by method of least squares and moving averages.
5. Determination of seasonal indices by the method of Ratio to moving averages.
6. Determination of seasonal indices by the method of Ratio to trend.
7. Determination of seasonal indices by the method of link Relatives.

SECTION - B

8. Construction of $\bar{\bar{X}}$, R and $\sigma\sigma$ - charts.

9. Construction of p, np, charts with fixed and varying n.
10. Construction of c and u charts.
11. Designing a single sampling plan and construction of its OC and ASN curves.
12. Designing a double sampling plan and construction of its OC and ASN curves.

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(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Practical Paper-VI: MS - EXCEL
(with 2 HPW,1 Credit)

Time Series Analysis

1. Measurement of trend by method of least squares and moving averages.
2. Determination of seasonal indices by the method of Ratio to moving averages.
3. Determination of seasonal indices by the method of Ratio to trend.
4. Determination of seasonal indices by the method of link Relatives.

Index Numbers

5. Base shifting, splicing and Deflation.

Statistical Quality Control

6 Construction of $\bar{\bar{X}}\bar{X}$, R and $\sigma\sigma$- charts.

7 Construction of p and np charts with fixed n.
8 Construction of p and np charts with varying n.
9 Construction of c and u charts.

Demand Analysis

10 Construction of Lorenz curve.
11 Fitting of Pareto law to an income data.

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(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Paper- VII: Design of Experiments, Vital statistics, Official Statistics and Business Forecasting

COURSE CODE:STAT701

Course Outcome:

- Understand the potential practical problems in its implementation.
- Construct optimal or good designs for a range of practical experiments.
- Appreciate the advantages and disadvantages of a design for a particular experiment.
- Describe how the analysis of the data from the experiment should be carried out

UNIT –I

Analysis of Variance and Design of Experiments : Concept of Gauss-Markoff linear model with examples, statement of Cochran's theorem, ANOVA – one-way, two-way classifications with one observation per cell Expectation of various sums of squares, Statistical l analysis, Importance and applications of design of experiments.

UNIT –II

Principles of experimentation: Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D),Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies of above designs.

UNIT – III

Vital statistics: Introduction, definition and uses of vital statistics. Sources of vital statistics, registration method and census method. Rates and ratios, Crude death rates, age specific death rate, 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 rate sand Net reproductive rate, Life tables, construction and uses of life tables and Abridged life tables.

UNIT – IV

Official Statistics: Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National Income and its computation, utility and difficulties in the estimation of national income.

Business Forecasting: Role of forecasting in Business, Steps in Forecasting, Methods of Forecasting, Choice of a method of Forecasting, Theories of Business Forecasting, Cautions while using Forecasting Techniques.

Reference Books:

1. V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand
2. ParimalMukhopadhyay : Applied Statistics . New Central Book agency.
3. M.R.Saluja : Indian Official Statistics. ISI publications.
4. B.L.Agarwal: Basic Statistics. New Age publications.
5. S.P.Gupta : Statistical Methods. Sultan Chand and Sons.
6. Pratirupa Sidhanthamulu – Telugu Academy. Prayoga Rachana and Visleshana – Telugu Academy.

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B.Sc Statistics III Year Semester- VI Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Paper- VIII: Operations Research
(3 HPW with 3 Credits)

COURSE CODE:STAT801

Course Outcome:

- Formulate and solve problems as graphs.
- Develop linear programming (LPP) models, transportation, transshipment, assignment and sequencing problems.
- Solve the problems using special solution algorithms.

UNIT –I

Operations Research: Meaning and scope of OR. Convex sets and their properties. Definition of general LPP. Formulation of LPP. Solution of LPP by graphical method. Statements of Fundamental theorem of LPP and other related theorems. Simplex algorithm.

UNIT –II

Concept of artificial variables. Big –M /Penalty method and two-phase simplex methods. Concept of degeneracy and resolving it. Concept of duality of LPP. Dual Primal relationship, Statement of Fundamental Theorem of Duality.

UNIT –III

Definition of transportation problem, TPP as a special case of LPP, Initial basic feasible solutions by North-West Corner Rule, Matrix minimum method and VAM. Optimal solution through MODI tableau and stepping stone method for balanced and unbalanced transportation problem. Degeneracy in TP and resolving it. Concept of Transshipment problem.

UNIT –IV

Formulation and description of Assignment problem and its variations. Assignment problem as special case of TP and LPP. Unbalanced assignment problem, optimal solution using Hungarian method and traveling salesman problem and its solution.

Problem of Sequencing. Optimal sequence of N jobs on two and three machines without passing.

Reference Books:

1. Kanti Swaroop, P.K.Gupta and ManMohan: Operations Research. Sultan Chand.
2. S.D. Sharma: Operations Research
3. J.K. Sharma: Operations Research Theory and Applications. Macmillan Publishers India LTD.
4. Parikriya Parishodhana - Telugu Academy.

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B.Sc Statistics III Year Semester- VI Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Practical Paper-VII: Theory Paper VII and VIII
(with 2 HPW, 1 Credit)

SECTION –A

1. Analysis of CRD
2. Analysis of RBD and Comparison of RBD with CRD with and without missing observation.
3. Analysis of RBD with one missing observation and computation of Critical Difference.
4. Analysis of LSD and Comparison of LSD with RBD with CRD.
5. Analysis of LSD with one missing observation and computation of Critical Difference.
6. Computation of Morality rates and Fertility rates and Construction of complete life tables.

SECTION –B

7. Solution of L.P. problem by simplex method and reading the solution of the dual problem from Optimal Simplex table.
8. Solution of L.P. problem by Big-M Method.
9. Two-phase simplex method.
10. IBFS for a transportation problem by North-West corner rule, Matrix minimum method and Vogel's approximation method and also Optimum solution to balanced and unbalanced transportation problem by MODI method.
11. Optimum solution to balanced and unbalanced Assignment problem by Hungarian method and also Solution of traveling salesman problem.
12. Computation of Optimal Sequence and idle time for N jobs on 2 and 3 machines.

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B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
Practical Paper-VI: MS - EXCEL
(with 2 HPW, Credit 1)

Operations Research:

1 Solution of L.P. problem by Graphical method.
2 Solution of L.P. problem by simplex method.
3 Solution of L.P. problem by Big-M and two-phase simplex method.
4 Optimum solution to balanced and unbalanced transportation problem using North-West corner rule, Matrix minimum method and Vogel's approximation method for IBFS.
5 Solution of Assignment problem for both maximization and minimization
6 Solution of travelling salesman problem.
7 Computation of Optimal Sequence and idle time for N jobs on 2 and 3 machines.

Designs of Experiments

8. Analysis of CRD
9. Analysis of RBD with and without missing observation. Comparison of RBD with CRD
10. Analysis of LSD with and without missing observation. Comparison of LSD with RBD and CRD

Vital Statistics

11. Computation of Morality rates, Fertility rates and Reproduction rates.
12. Construction of life tables and abridged life tables.

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B.Sc Statistics III Year Semester- V & VI
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019

MODEL QUESTION PAPER

Time : 2 ½ hrs   **Max. Mar: 75**

SECTION- A

Note: Answer any Five of the following. Each question carries 3 marks. 5 x 3 = 15 Marks

13.   UNIT-I
14.   UNIT-I
15.   UNIT-II
16.   UNIT-II
17.   UNIT-III
18.   UNIT-III
19.   UNIT-IV
20.   UNIT-IV

SECTION- B

Note: Answer all questions.   **4 x 15 = 60 Marks**

21.   a) UNIT-I
(or)
b) UNIT-I
22.   a) UNIT-II
(or)
b) UNIT-II
23.   a) UNIT-III
(or)
b) UNIT-III
24.   a) UNIT-IV
(or)
b)UNIT-IV

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BEGUMPET, HYDERABAD- 500016
B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
SEC-3: Big Data Analysis
COURSE CODE: 300/SEC/E
(2 HPW with 2 Credits and 50 Marks)

UNIT I

The Rise of Big Data: What is Big Data and why does it matter; Web Data: The original Big Data; The cross section of Big Data and the value they hold;

UNIT II

Taming Big Data: The Technologies, Process and Methods: The Evolution of Analytic Scalability, The Evolution of Analytic Process, The Evolution of Analytic Tools and Methods.

Text Book:

1.   Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.   (Chapters 1 to 6).

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
3. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

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B.Sc Statistics III Year Semester- VI Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
SEC-4: Statistical Techniques in Data Mining

COURSE CODE: 400/SEC/E
(2 HPW with 2 Credits and 50 Marks)

UNIT-I

Introduction: Introduction to Data mining, The nature of Data sets, Types of structure, Models and patterns, Data mining Tasks, components of data mining algorithms, The Interacting roles of Statistics and Data mining, Data mining: Dredging, snooping and fishing.

UNIT-II

Data mining: Definitions, KDD vs Data mining, DBMS vs DM, other related areas, DM Techniques, other mining problems, Issues and challenges in Data mining,

Association Rules: What is an association rule, methods to discover association rules; Apriori Algorithm, Partition Algorithm

Reference Books:
1. David Hand, Heikki Manila and Padhraic Smyth (2012): Principles of Data Mining, PHI, New Delhi, (Text Book: Ch. 1, Ch. 2, Ch. 10.6)
2. Arun K Pujari (2013): Data Mining Techniques, University Press Inia private Ltd. Third Edition. (T.B-2: (T.B.2: Ch 5.4, 5.8, Ch. 6.18)

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B.Sc Statistics III Year Semester- V Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
GE – 1 –Basic Statistics-1

COURSE CODE: 500/GE/E
(2 HPW, Credits 2 and Marks 50)

UNIT–I

Origin, Importance and growth of Statistics, Collection and tabulation of data. Frequency distribution. Graphical and Pictorial representation of data. Measures of central tendency: Mean, Median and Mode their merits and demerits with examples. Partition Values: Quartiles, Deciles and percentiles and examples. Measures of dispersion: Range and standard deviation, coefficient of variation. Central and non- Central moments, coefficient of Skewness and Kurtosis, Examples.

UNIT – II

Review of permutations and combinations. Deterministic and random experiment, Sample space, event mutually exclusive, equally likely and independent events with examples. Mathematical,Statistical and axiomatic definition of probability, Addition theorem, conditional probability and multiplication theorem of probability. Statistical independence and Bayes theorem –simple examples (all theorems without proofs and only statements).

List of reference books:

1.   V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2.   GoonAM,GuptaMK,Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3.   Charles M.Grinstead and Laurie Snell, J: Introduction to Probability, American Mathematical Society.

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B.Sc Statistics III Year Semester- VI Syllabus
(With Mathematics Combination)
(Examination at the end of Semester)
With effect from Academic Year – 2018-2019
GE – 2 –Basic Statistics-2
(2 HPW with 2 Credits and 50 Marks)
COURSE CODE: 600/GE/E

UNIT - I

Definition and sample examples of random variables and distribution function, probability mass function and probability density function. Mathematical expectation and moments-simple examples. Discrete probability distributions: Bernoulli, Binomial, Poisson. (Concept, definition, statements of mean and variance only) with real life examples. Continuous probability distributions: Uniform, Normal and Exponential distributions (concept, definition, statements of mean, variance and other properties).

UNIT – II

Empirical bivariate distributions, Covariance, Karl Pearson coefficient, Rank Correlation, Curve fitting by least squares principle. Simple linear regression. Concept and definition of population, parameter, sample, statistic, sampling distribution and standard error. Properties of Estimates: Unbiasedness, Consistency and Efficiency (concept and definition only), simple examples. Concept of testing Statistical hypothesis-Definition of Null and Alternative hypothesis, Critical region, Types of errors, level of Significance and Power of a Test.
Tests of significance based on Chi-Square, t and F distributions and ANOVA (One and Two way) with examples (No mathematical derivation only methodology).

List of reference books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. GoonAM,GuptaMK,Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolakota.
3. Charles M.Grinstead and Laurie Snell.J: Introduction to Probability, American Mathematical .Society

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MODEL QUESTION PAPER FOR G.E- 1&2

Time : 1 ½ hr   **Max. Mar: 40**

SECTION-A

Note: Answer any Four of the following questions. Each question carries 4 marks 4 x 4= 16

1.   Unit-I
2.   Unit-I
3.   Unit-I
4.   Unit-II
5.   Unit-II
6.   Unit-II

SECTION-B

Note: Answer the following question.   **2 x 12= 24 Marks**

1.   a) Unit-I
(or)
b) Unit-I
    2.   a) Unit-II
(or)
b) Unit-II

Note: Internal is for 10 Marks