SAURASHTRA UNIVERSITY

Re-Accredited Grade B by NAAC
(CGPA 2.93)

FACULTY OF SCIENCE

SYLLABUS FOR

Bachelor of Science

(Statistics)

(Semester-V & VI)

In Force From June-2013

SAURASHTRA UNIVERSITY
RAJKOT-360005 (GUJARAT)

WEBSITE : www.saurashtrauniversity.edu

T.Y.B.Sc.
(STATISTICS)
Semester –V

S-501

COMPUTATIONAL TECHNIQUES & STATISTICAL TOOLS WITH MATHLAB

70 MARKS

Unit-1 Interpolation:

1.1 Finite differences

- Definitions
- Interpolation, Gregory Newton's interpolation for equal intervals. Method of interpolation.

1.2 Divided differences

- Newton's divided difference of unequal interval.
- Lagrange's divided difference of unequal and equal interval.

1.3 Central differences

- Gauss, Sterling and Bessel's formula

1.4 Inverse interpolation and its accuracy

Unit-2 Numerical Differentiation, Integration and solution of algebraic equations:

- Trapezoidal rule, Simpson's one-third rule and 3/8 rule, Weddle's rule, Picard's and Taylor's method of successive, Euler-Mecluren's summation formula.
- Graphical method: For finding roots of algebraic equations.
- False position method, Iteration method.
- Newton Raphson's method, Newton's formula for obtaining square root, Inverse and Inverse square root.

Unit-3 MATAB Tutorial & Overview:

3.1 Basic Feature

- Simple Math, Number Display Formats, Other Basic feature, Statistical toolbox

3.2 Common Mathematical Functions & Operator

- Mathematical Notation and Typographic Conventions
- Square, Sin, PI, Complex number etc.
- Relational and logical operators.

3.3 Array Operators & Decision Making Control Flow

- Simple Arrays, Array Addressing etc.
- For loops, Wile loops, If-Else-End Structures

3.4 Summary and Other Features

- corrcoef, cov, cumprod, cumsum, diff, hist, mean, median, prod, ran randn, sort std, sum etc.

3.5 Descriptive Statistics & Probability Distribution

- Measure of Central Tendency

- Measure of Dispersion
- Precentile and graphical Descriptions and bootstrap
- Binomial, Poisson, Geometrc, Hypergeometric, Chi-square, F, Normal, Lognormal, Gamma and Beta for computing Parametric estimates and confidence intervals.

3.6 Linear Models & Statistical Plots
- One-way, two-way Analysis of variance and analysis of Covariance
- Box plots and distribution plots.

REFERNCE

1. Gupta P. P. and Malik G. S. (94-96), Numberical Analysis.
2. Gupta-Malik (1998), Calculus of Finite differences & Numerical Analysis.
3. Hidebrand P. B. (1956): Introduction to Numerical Analysis, Mc Grow Hill
4. Kunz: Numerical Analysis
5. Raval and Patel: Numerical Analysis (Gujarati)
6. Statistics Tool box for used with MATLAB(2005).
7. The Ultimate Computing Environment for Technical Education MATLAB (ver-4) (1995), PRENTICE HALL, Engle wood Cliffs, NJ

T.Y.B.Sc.
(STATISTICS)
Semester –V

S-501

COMPUTATIONAL TECHNIQUES

PRACTICAL   (27 Marks)

1. Construction of different tables.
2. Gregory Newton's Interpolation formula.
3. Newton's divided difference formula.
4. Lagrange's Interpolation formula.
5. Central difference formula of Gauss, Sterling and Bessel.
6. Numerical evaluation of integral using Trapezoidal, Simpson 1/3, 3/8 rule, Weddle's rule.
7. Solution of Algebraic equation by graphical, false position iteration method.
8. Newton-Raphson's method and its square root, inverse and inverse square-root formula.
9. Picard's and Taylor's method of successive.
10. Euler-Maclaurin's summation formula.
11. STATISTICS TOOLBOX WITH MATLAB

Note: Viva-voce and Practical Journals   (8 Marks)

ELECTIVE PAPER OF T.Y.B.Sc.
(STATISTICS)

Semester – V

S-501

APPLIED DECISION MAKING

70 MARKS

Unit-1:

The Decision Problem

- **Introduction**
- Element of decision theory
- Decision Making Under Uncertainty
    i. Laplace (equally likely decision) criterion
    ii. Maximin or Minimax criterion
    iii. Maximax or Minimin criterion
    iv. Hurwicz criterion
    v. Regret criterion
- Decision Making Under Risk
    i. Expected Monetary Value (EMV)
    ii. Expected Opprtunity Loss (EOL)
    iii. Expected Value of Perfect Information (EVPI)
- Bayesian Analysis: Posterior Analysis
- Decision Trees

Unit-2:

Decision under competition

- Two person zero sum games
- Pure and mixed strategies
- Saddle points
- Dominance principle
- Uniqueness of value
- Solving 2×2 games
- Solving $2 \times n$ games
- Competitive and vindictive solutions of non-zero games
- Equilibrium points.

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Unit-3:

Application of Decision Problem

- The assignment problem economic order quantity model for inventory
- Inventory problems with random demand
- Critical path methods for production planning PERT and CPM
- Project crashing
- Risk analysis

REFERNCE

1. Bajpai Naval, Business Statistics, Indian Institute of Information Technology and Management, Gwalior
2. Sharma Anand, Statistics for Management, Indian Institute of Industrial Engineering, Delhi
3. Sharma J. K., Quantitative Techniques for Management.

ELECTIVE PAPER OF T.Y.B.Sc.
(STATISTICS)
Semester –V

S-501

APPLIED DECISION MAKING

PRACTICAL   (27 Marks)

1. Examples based on Decision Making Under Uncertainty
2. Examples based on Decision Making Under Risk
3. Examples based on Decision Trees
4. Examples based on Decision under competition
5. Examples based on Inventory Models
6. Examples based on PERT & CPM
7. Examples based on Project Crashing
8. Example based on Risk Analysis

Note: Viva-voce and Practical Journals   (8 Marks)

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T.Y.B.Sc.
(STATISTICS)
Semester –V

S-502

MATHEMATICAL STATISTICS

70 MARKS

Unit-1 Limit Laws:

- Chebychev's inequality and its examples.
- Idea of convergence in probability and distribution.
- Law of large number.
- Weak law of large number and its examples.
- De-moivere-laplace theorem and its examples.
- Definition of characteristic function and its elementary properties, Statement of inversion theorem and its applications.
- Central limit theorem, Lindberge-Levy's central limit theorem.

Unit-2 Continuous Distribution (Univeriate) :

- Normal Distribution: Definition, properties and derivation of p.d.f., moments, median, mode, proof of important properties
- Definition, Distribution function, properties and moments of Gamma and Beta
- Introduction of distributions :Uniform, Exponential, Parato, Weibull, Laplace, Cauchy and truncated binomial and poisson, Log-normal
- Chi-square Distribution: Definition, derivation of its p.d.f., m.g.f., c.g.f. its moment and coefficient of skewness. Limitting term, mode, theoretical examples.
- t- Distribution: Definition, derivation of its p.d.f., its moment and coefficient of skewness, limiting term and mean deviation about mean.
- F- Distribution: Definition, derivation of its p.d.f., its moment, mode.
- Relations between t and F distribution and Relations between F and $\aleph^2$ distributions.

Unit-3:

3.1 Partial & Multiple Correlation and Regression

- Partial Correlation and Multiple Correlation for 3 variables, its measures and related results.
- Test of significance of Partial Correlation Coefficient and Multiple Correlation Coefficients.

3.2 Bivariate Normal Distribution

- Definition of Bivariate Normal Distributions, Probability density of BVN distributions, Moment Generating Function, Marginal, Conditional Distributions and its examples.

REFERNCE

1 Goon A. M., Gupta M. K. and Dasgupta B.(1980), Fundamentals of Statistics VOL-II. The World Press Publishers Pvt. Ltd. Calcutta.

2 Gupta S. C. and Kapoor V. K.(2012), Fundamentals of Mathematics and Statistics, Eleventh Edition, Sultan Chand & Sons, New Delhi.

3 Hogg R. V. and Craig A. T.(1978), Introduction to Mathematical Statistics Forth edition; Collier Macmilan Publishers.

4 Kenny J. S. & Keepine E. S.(1954), Mathematical Statistics VOL-I and VOL-II.

5 Rao C. R. (1973), Linear statistical Inference and its applications, Second Edition, Wiley Eastern Private Limited, New Delhi.

6 Rohatgi V. K. (1986), An Introduction to probability theory & Mathematical Statistics Willey Eastern.

T.Y.B.Sc.
(STATISTICS)
Semester – V

S-502

MATHEMATICAL STATISTICS

PRACTICAL   (27 Marks)

1 Examples based on Normal Distribution

2 Examples based on $\aleph^2$- distribution

3 Examples based on t – distribution

4 Examples based on F – distribution

Note: Viva-voce and Practical Journals   (8 Marks)

T.Y.B.Sc.
(STATISTICS)
Semester –V

S-503

STATISTICAL INFERENCE

70 MARKS

Unit-1:

1.1 Point Estimation

- Unbiasedness, Consistency, Sufficiency, Factorization Theory(Without Proof), relative efficiency, illustrations of point estimation
- Definition of MVUE
- Cramer Rao Inequality, CR lower bound and its applications, Amount of information
- Rao-Black well theorem
- Concept of complete sufficient Statistic with illustration.

Unit-2:

2.1 Method of Estimation

- Method of moments and its illustration
- Method of maximum likelihood and its illustration
- Properties of MLE (only statements) and example
- Method of minimum Chi-square.

2.2 Linear models & Linear Estimation

- Linear model
- Assumption, Estimability and BLUE
- Method of least square
- Gauss-markov theorem
- Estimation of error variance

Unit-3:

3.1 Testing of Hypothesis

- Statistical Hypothesis simple and composite hypothesis
- Types of Error, Statistical tests, Critical region
- Power function and Power of a test with illustration
- Definition of MP
- N.P. Lemma its application in testing of hypothesis regarding Binomial, Poisson, Normal and Exponential distribution
- Definition of UMP test and its comparison with MP test
- Likelihood Ratio test and its examples for Binomial, Poisson and Normal distribution

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3.1 Sequential Probability Ratio Tests:

- Need for sequential tests
- Wald's SPRT with illustrations
- OC and ASN function for Binomial, Poisson and Normal distributions.

REFERNCE

1. Dharmadhikari and Patel: Statistical Inference, Gujarat Board.
2. Gupta S. C. and Kapoor V. K.(2012), Fundamentals of Mathematics and Statistics, Eleventh Edition, Sultan Chand & Sons, New Delhi.
3. Hogg R. V. and Craig A. T.(1978), Introduction to Mathematical Statistics, Fourth Edition, Collier Mc Milan Publishers.
4. Mood A. M. Graybill F. A. and Bosse D. C. (1974), Introduction to the Theory of Statistics, Third Edition, Mc Grow Hill.
5. Rao C. R. (1973), Linear statistical Inference and its applications ,Second Edition, Wiley Eastern Private Limited, New Delhi.
6. Rohatgi V. K.(1986), An Introduction to probability theory and Mathematical Statistics, Wiley Eastern.
7. Silvey S. D.(1970), Statistical Inference, Penguin Books.

T.Y.B.Sc.
(STATISTICS)
Semester – V

S-503

STATISTICAL INFERENCE

PRACTICAL   (27 Marks)

1. Method of estimation
2. Method of moments
3. Maximum likelihood estimator
4. MLE of truncated Binomial and Poisson distribution
5. Two types of error
6. Power of test
7. Drawing power curve of test
8. SPRT for Binomial, Poisson and Normal distribution
9. Drawing of OC and ASN

Note: Viva-voce and Practical Journals   **(8 Marks)**

T.Y.B.Sc.
(STATISTICS)
Semester –VI

S-601

DESIGN OF EXPERIMENTS AND SAMPLING TECHNIQUES
70 MARKS

Unit-1 DESIGN OF EXPERIMENTS:

1.1 Basic concepts of Design of Experiment
- Need for Design of Experiments
- Fundamental principles of Design of Experiment

1.2 Analysis of variance
- Model and assumptions
- Derivation of analysis of variance for one-way classification (with fixed effect models).
- Derivation of analysis of variance for two-way classification (with fixed effect models).

1.3 Basic Design
- C.R.D., R.B.D., L.S.D. with their analysis
- Missing plot technique (Up to two missing values) for R.B.D. and L.S.D.

1.4 Efficiency
- Efficiency of designs
- Efficiency of R.B.D. over C.R.D.
- Efficiency of L.S.D. over C.R.D. and R. B.D.

1.5 Factorial Designs
- Concept of Factorial designs and its comparison with basic design.
- 2^2, 2^3, 3^2 factorial design and their analysis of variance table.
- Concept of Confounding Experiments with example.
- Concept of total and partial confounding with illustrations

Unit-2 CONCEPT OF SAMPLING and SAMPLING METHODS:

2.1 Concept of Sampling
- Concept of population and sample
- Need for sampling, census and sample survey
- Basic concepts in sampling, sample selection, sample size, sampling frame, sampling error and non-sampling error.

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2.2 Simple random sampling

- Simple random sampling with and without replacement
- Estimation of population mean, population and variance.

2.3 Stratified random sampling

- Estimation of population mean and its variance.
- Different types of allocation: Neyman, Proportional and Optimum, their comparison with simple random sampling

2.4 Systematic sampling

- Estimation of population mean and its variance.
- Comparison with simple random and stratified samplings, elements of non sampling errors.

REFERNCE

1. Chaudhuri Arijit and Strenger H. (2005), Theory and Methods of Survey Sampling, Chapman & Hall/CRC, Taylor & Francis Group, New Yourk.
2. Cochran W. G. and Cox G. M. (1957) Experimental design, John Wiley.
3. Cochran W. G. (2007), Sampling Technique, Third Edition, Wiley-India, New Delhi.
4. Das, M.N. and Giri, N. (1975). Design and analysis of experiments. New age international publication.
5. Ghosh D. K. (2013), Factorial Designs, Saurashtra University, Rajkot.
6. Goon A. M., Gupta M. K. and Dasgupta B. (1986), Fundamental of Statistics, VOL-2, World Press, Calcutta.
7. Gupta S. C. and Kapoor V. K.(2011), Fundamentals of Applied Statistics, Fourth Edition, Sultan chand & Sons, New Delhi.
8. Murthy, M. N. (1977). Sampling theory and methods. Statistical publishing society. Kolkatta.
9. Mukhopadhyay Parimal(2008), Theory and Methods of Survey Sampling, Second Edition, Prentice Hall India.
10. Shah S. M., Experimental design and sampling techniques(Gujarat Board)
11. Sukhatme et al. (1984), Sampling Survey methods and its applications, Indian Society of Agricultural Statistics.
12. W. G. Cochran (1984), Sampling techniques, third edition, Wiley Eastern.

T.Y.B.Sc.
(STATISTICS)
Semester – VI

S-601

DESIGN OF EXPERIMENTS AND SAMPLING TECHNIQUES

PRACTICAL (27 Marks)

1. ANOVA for one-way and two-way classification(with fixed effect models)
2. Analysis of C.R.D., R.B.D. and L.S.D.
3. Efficiency of R.B.D. over C.R.D., Efficiency of L.S.D. over C.R.D. and L.S.D. over R.B.D.
4. Missing plot techniques(Up to Two) for R.B.D. and L.S.D.
5. 2^2, 2^3, 3^2 Factorial experiments
6. Concept of total confounding
7. Only selection of sample and determination of sample size
8. Simple random sampling, Stratified random sampling and Systematic random sampling
9. Gain due to stratification from the simple random sampling

Note: Viva-voce and Practical Journals (8 Marks)

T.Y.B.Sc.

(STATISTICS)

Semester –VI

S-602

STATICAL QUALITY CONTROL & OPERATION RESEARCH

70 MARKS

Unit-1 STATISTICAL QUALITY CONTROL (INTRODUCTION AND THEORY OF CONTROL CHARTS):

- Introduction
- Quality and Quality Control, Variations in Quality, Theory of Control Charts. Theory of Runs
- Specification Limits, Process Limits and Revised Limits
- Use of Statistical Quality Control.
- Charts for Variables: $\bar{X}$ chart, R chart, σ – chart
- Charts for Attributes: np-chart, p-chart, c-chart

Unit-2 STATISTICAL QUALITY CONTROL (ACCEPTANCE SAMPLING PLANS):

- Principles of acceptance sampling problem of lot acceptance
- Simulation of good and bad lots
- Producer's risks and consumer's risks, AQL and LTPD
- Single Acceptance Sampling Plan and Double Acceptance Sampling plans and their functions like OC, ASN, AOQ and ATI

Unit-3 OPERATION RESEARCH:

3.1 Linear Programming Problem

- Elementary theory of convex sets
- Definition of general linear programming problems
- Problems occurring in various fields
- Graphical simplex method of solving LPP
- Method of solving LPP: Simplex, Two Phase, Revise and Big-M
- Duality of LPP and its examples

3.2 Transportation problem (non-degenerate and balances case only)

- Definition and Concept.
- Method of initial feasible solution: N-W corner, Least cost Vogel's. Ghosh and Gaglani

3.3 Assignment problem

- Definition and Concept.
- Method of solution: Hungarian, Ghosh and Galani.

REFERNCE

1. Cowden D. J. (1960), Statistical method in Quality Control, Prentice Hall.
2. Ducan A. J.(1974), Quality Control and Industrial Statistics, Fourth Edition, Taraoprewal and Sons.
3. E. L. Grant (1964), Statistical Quality Control, Third edition, Mc Grow Hill.
4. Gupta S. C. and Kapoor V. K.(2011), Fundamentals of Applied Statistics, Fourth Edition, Sultan chand & Sons, New Delhi.
5. Sharma J. K.(2009), Operations Research Theory and Application, Fourth Edition, MACMILLAN PUBLICHSERS INDIA LIMITED, New Delhi.
6. Taha Hamdy A.(2008), Operations Research: An Introduction, Eight Edition, Pearson Prentice Hall, New Delhi.

T.Y.B.Sc.
(STATISTICS)
Semester –VI

S-602

STATICAL QUALITY CONTROL & OPERATION RESEARCH

PRACTICAL   (27 Marks)

1. Control Charts: $\bar{X}$ chart, R chart, σ – chart, np-chart, p-chart, c-chart
2. Single acceptance sampling plan and Double acceptance sampling plan..
3. Graphical simplex method of solving LPP
4. Method of solving LPP: Simplex, Two Phase, Revise and Big-M
5. Method of initial feasible solution: N-W corner, Least cost Vogel's. Ghosh and Gaglani
6. Method of solution: Hungarian, Ghosh and Galani.

Note: Viva-voce and Practical Journals   (8 Marks)

PROGRAMMING WITH C++ AND VITAL STATISTICS

70 MARKS

Unit -1:

1.1 Introduction

- History & Features of C Language
- Components of C Language
- Structure of C Program
- C Editor Command

1.2 Variable, Identifier, Constants, Operators and expressions

- Variable declaration, Local, Global, Parametric variables, Assignment of variables.
- Basic Data Types, Enumerated data types, Derived data types.
- Constants.
- Arithmetic, Relation and logical operators, Assignment operators, Increment and Decrement operators, Conditional operators, Bitwise operators.

Unit -2

2.1 Control Statement

- Control statements.
- Conditional statements.
- If……else Statement and Nesting of if……else.
- Switch statement, Break Statement.
- For loop statement.
- While loop statement.
- Do while loop statement.

2.2 Functions and Arrays Statement

- Standard header file
- Library function.
- String functions
- Mathematical functions
- One dimensional Array
- Two dimensional Array
- Multi dimensional Array

Unit -3 Vital Statistics:

3.1 Introduction
- Uses of Vital Statistics.
- Methods of Obtaining Vital Statistics.

3.2 Measure of Population.

3.3 Rates and Ratio of Vital Events.

3.4 Measurement of Mortality.
- Crude Death Rate (C.D.R.)
- Specify Death Rate (S.D.R.)
- Standardized Death Rates.

3.5 Mortality Table or Life Table
- Stationary Population
- Stable Population
- Central Mortality Rate.
- Force of Mortality.
- Assumptions, Description and Construction of Life Table.
- Uses of Life tables.

3.6 Fertility
- Crude Birth Rate (C.B.R.)
- General Fertility Rate (G.F.R.)
- Specific Fertility Rate (S.F.R.)
- Total Fertility Rate (T.F.R.).

3.7 Measurement of Population Growth
- Crude Rate of Natural Increase and Pearle's Vital Index
- Gross Reproduction Rate
- Net Reproduction Rate

REFERANCE

1. Balaguruswamy E: Programming in ANSI C, Tata Mc Graw Hill.
2. Gottfried Byrons: Theory and problems of programming with C , TMH.
3. Gupta S. C. and Kapoor V. K.(2011), Fundamentals of Applied Statistics, Fourth Edition, Sultan Chand & Sons, New Delhi.
4. Kanitkar Y.P. Working with C, BPB publication.
5. Kernighan Brian W. and Ritchie Dennis M. (1991), The C programming Language, Second Edition, Prentice-Hall of India Prv. Ltd., New Delhi.
6. Schildt Herbert C: Made Easy, Mac Graw Hill.
7. Schildt Herbert C: The Complete reference IIIEd .TMM

T.Y.B.Sc.
(STATISTICS)
Semester – VI

S-603

PROGRAMMING WITH C++ AND VITAL STATISTICS

PRACTICAL   (27 Marks)

1. Mathematical Series Print Problems.
2. Finding nPr and nCr.
3. Finding Maximum and Minimum value of a given set of Observations.
4. Mean, Variance for ungrouped data.
5. Mean, Variance for grouped data.
6. Simple and compound interest.
7. Use of library, String and mathematical functions.
8. Arrange ascending/descending number and alphabet.
9. Matrix addition, subtraction and multiplication of matrix.
10. Fining correlation coefficient of ungrouped data
11. Finding the Binomial and Poisson probability.
12. Vital Statistics

Note: Viva-voce and Practical Journals   (8 Marks)

ELECTIVE PAPER OF T.Y.B.Sc.
(STATISTICS)
Semester –VI

S-603

APPLIED STATISTICS

70 MARKS

Unit -1 INVENTORY CONTROL:

- Costs associated with inventory-classification of inventory systems
- Lot-size models with and without shortage(back order policy only)
- Inventory models under price breaks and quantity discount
- Deterministic inventory models under given rest icons-ABC and VED analysis
- Elasticity of demand and supply with short exercise.

UNIT-2 QUEUING THEORY AND SEQUENCING

- Basic concepts for a quieueins system
- Study of M/M/1:(00/FIFO) and M/M/m:(00/FIFO) queues with simple properties
- Apply of queuing theory without any mathematical derivations.
- Problem of sequencing-sequencing of n jobs on two and three machines.

Unit -3 NON-PRAMAETRIC TEST

- Introduction
- Advantage and Disadvantage of Non-parametric test over Parametric test.
- Sign Test: One-sample and Paired Observations
- Wilcoxon Signed-Rank Test: One-sample and Paired Observations
- Kolmogorov-Smirov's Test for Goodness of Fit
- Median Test
- Mann-Whitney Test for Two Samples
- Kruskal-Walli Test.

REFERANCE

1. Ken Black (2008),Business Statistics,Fourth Edition, Welly-India, Sheel Print-N-Pack, Noida.
2. Gupta S. C. and Kapoor V. K.(2012), Fundamentals of Mathematics and Statistics, Eleventh Edition, Sultan Chand & Sons, New Delhi.

3. Levin Rechard I. and Rubin David S. (2008) ,Statistics for Management, Pearson Prentice Hall, New Delhi.
4. Sharma J. K.(2009), Operations Research Theory and Application, Fourth Edition, MACMILLAN PUBLICHSERS INDIA LIMITED, New Delhi.
5. Taha Hamdy A.(2008), Operations Research: An Introduction, Eight Edition, Pearson Prentice Hall, New Delhi.

T.Y.B.Sc.
(STATISTICS)
Semester –VI

S-603

APPLIED STATISTICS

PRACTICAL   (27 Marks)

1. Inventory Control
2. Queuing theory and Sequencing
3. Non-Parametric Test

Note: Viva-voce and Practical Journals   (8 Marks)

::NOTE::

1. There shall be six theory period of 55 minutes per week for S-501, S-502, S-503, S-601, S-602 and S-603 papers.

2. There shall be question paper of 70 marks 2 hours and 30 minutes for S-501, S-502, S-503, S-601, S-602 and S-603 papers.

3. There shall be three theory periods of 55 minutes per week for project of semester 5th and 6th.

4. The project of 5th and 6th semester will consist of minimum 50 pages. Project will be submitted on 6th semester.

5. The project report submission of 5th and 6th semester (40 Marks + 40 Marks) and Viva-voce examination (10 Marks + 10 Marks) will constitute 100 Marks.

6. There shall be 6 practical period of 55 minutes per week for S-501, S-502, S-503, S-601, S-602 and S-603 papers.

7. There shall be practical question paper of 35 Marks of 3 hours for Statistics papers S-501, S-502, S-503, S-601, S-602 and S-603 papers.

8. Format of Theory Question Paper (University Examination)

   There shall be 3 questions.

Question	Question Type	Marks
1	Multiple Choice Question (Each question one mark)	20
2(a)	Write any three out of six (Each question two marks)	06
2(b)	Write any three out of six (Each question three marks)	09
2(c)	Write any two out of five (Each question five marks)	10
3(a)	Write any three out of six (Each question two marks)	06
3(b)	Write any three out of six (Each question three marks)	09
3(c)	Write any two out of five (Each question five marks)	10

9. Format of Practical Question Paper (University Examination)

1	Answer three questions (Question ask with internal options)	27 Marks
2	Viva-Voce and practical journal	08 Marks

10. Theory Internal **30 Marks** and Practical Internal **15 Marks**.

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