KAKATIYA UNIVERSITY, WARANGAL

B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2016-17
(With Mathematics Combination)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>SEMESTER</th>
<th>THEORY/ PRACTICAL</th>
<th>Paper Title</th>
<th>WORK LOAD</th>
<th>CREDITS</th>
<th>MARKS</th>
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<tbody>
<tr>
<td>I</td>
<td>FIRST</td>
<td>Paper-I</td>
<td>Descriptive Statistics and probability</td>
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<td>(*)SEC-1</td>
<td>Computation using MS-Excel</td>
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<td>Statistical Methods</td>
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<td>Elective-I(A): SQC and LPP</td>
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Total work load of (Sem-I, Sem-III, Sem-V): 26
Total work load of (Sem-II, Sem-IV, Sem-VI): 26

(*)SEC-1,2,3,4: Skill Enhancement Courses for Statistics students (Theory exam only).
(**) GE-1, GE-2: For other than Statistics Course students (Theory exam only).

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### Practical Examination Pattern

<table>
<thead>
<tr>
<th>S. No</th>
<th>Pract No.</th>
<th>Method of Solving</th>
<th>No. of Problems given</th>
<th>Student has to attempt</th>
<th>Marks division</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
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<td>Using Computer (MS-Excel)</td>
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</tbody>
</table>

(*) Two problems are given from each unit. Student has to attempt any one problem only from each unit.

(©) Production of Record is compulsory in student’s own hand writing, periodically got signed by concerned lecturer, whenever a topic is completed. (Not at the end of semester all of sudden).

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Kakatiya University, Warangal
B.A/B.Sc. (Statistics) I Year, Semester-I
(CBCS)(With Mathematics Combination)
(Examination at the end of I Year, Sem-I)

Paper-I: Descriptive Statistics and Probability (DSC-2A)
(4 HPW :: 4 Credits :: 100 Marks)

Unit-I

Descriptive Statistics: 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 (Arithmetic mean, median, mode, geometric mean and harmonic mean) with simple applications, Absolute and relative measures of dispersion (range, quartile deviation, mean deviation, standard deviation and variance) with simple applications, Importance of moments, central and non-central moments, their inter-relationships, Sheppard’s correction for moments for grouped data, Measures of skewness based on quartiles and moments, kurtosis based on moments with real life examples.

Unit-II

Probability: Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favorable events with examples, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. 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

Random Variables: 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, statements 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, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and statements of their properties with applications, Chebyshev’s and Cauchy-Schwartz’s inequalities and their applications.

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List of reference books:

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

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(CBCS)(With Mathematics Combination)
(Examination at the end of I Year, Sem-I)

Practical-I
Descriptive Statistics and Probability
(2 HPW :: 1 Credit :: 50 Marks)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives) on graph sheets.
2. Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS-Excel.
3. Diagrammatic presentation of data (Various types of Bar and Pie diagrams) on graph sheets.
4. Diagrammatic presentation of data (Bar and Pie) using MS-Excel.
5. Computation of Measures of central tendency, dispersion, Coefficient of Variation and coefficients of Skewness, Kurtosis using calculator.
9. Computation of coefficients of Skewness and Kurtosis, Karl Pearson’s and Bowley’s $\beta_1$ and $\beta_2$ using calculator.
10. Computation of coefficients of skewness and kurtosis, Karl Pearson’s and Bowley’s $\beta_1$ and $\beta_2$ using MS-Excel.

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B.A/B.Sc. (Statistics) I Year, Semester-II
(CBCS)(With Mathematics Combination)
(Examination at the end of I Year, Sem-II)

Paper-II: Probability Distributions (DSC-2B)
(4 HPW :: 4 Credits :: 100 Marks)

Unit-I

Discrete distributions: Uniform, Bernoulli, Binomial, Poisson, Negative binomial, Geometric
and Hyper-geometric(mean and variance only) distributions their applications and uses.

Unit-II

Properties of distributions in unit-I: m.g.f., c.f., c.g.f., p.g.f., moments up to fourth order and
their real life applications. Reproductive property wherever exists. Binomial approximation to
Hyper-geometric, Poisson approximation to Binomial and Negative binomial distributions.

Unit-III

Continuous distributions: Rectangular and Normal distributions. Normal distribution as a
limiting case of Binomial and Poisson distributions. Exponential, Gamma, Beta distributions of
two kinds (mean and variance only) and Cauchy distribution (definition and c.f. only).

Unit-IV

Properties of distributions in unit-III: m.g.f., c.f., c.g.f., p.g.f., moments up to fourth order and
their real life applications and reproductive property wherever exists.
Statement and applications of weak law of large numbers, Strong law of large numbers and
central limit theorem for identically and independently distributed (i.i.d) random variables with
finite variance.

List of reference books:


2. Charles M. Grinstead and Laurie Snell, J: Introduction to Probability,American Mathematical

   Society.


   (Pvt) Ltd., Kolkata.


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B.A/B.Sc. (Statistics) I Year, Semester-II
(CBCS)(With Mathematics Combination)
(Examination at the end of I Year, Sem-II)

**Practical-2**
**Probability Distributions**
(2 HPW :: 1 Credit :: 50 Marks)

1. Fitting of Binomial distribution-Direct method. (Using calculator).
2. **Fitting of Binomial distribution-Direct method. (Using MS-Excel).**
5. **Fitting of Poisson distribution-Direct method. (Using MS-Excel).**
7. Fitting of Negative Binomial distribution. (Using calculator).
10. **Fitting of Normal distribution-Areas method. (Using MS-Excel).**
12. **Fitting of Normal distribution - Ordinates method. (Using MS-Excel).**
13. Fitting of Exponential distribution. (Using calculator).
14. **Fitting of Exponential distribution. (Using MS-Excel).**
15. Fitting of Cauchy distribution. (Using calculator).
16. **Fitting of Cauchy distribution. (Using MS-Excel).**

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B.A./B.Sc. (Statistics) II Year, Semester-III
(CBCS)(With Mathematics Combination)
(Examination at the end of II Year, Sem-III)

SEC-1
Computation using MS-Excel
(2 HPW :: 2 Credits :: 50 Marks)

Unit-I

Introduction to MS-Excel sheet, Statistical functions in it and writing formula in the Excel sheet.
Computation of the Statistical functions FACT, MMULT, MINV, GCD, LCM, LN, LOG10, MOD,
POWER, ROUND, SQRT, SUM, PRODUCT, TRUNK, AVEDEV, AVERAGE, AVERAGEIF,
AVERAGEIFS, GEOMEAN, HARMEAN, MEDIAN, SMALL, MODE, PERMUT, PERCENTILE,
QUARTILE, DEVSQ, COVAR, STANDARDIZE, STDEV, SKEW, KURT and their interpretation.

Unit-II

Computation of the Statistical functions: RSQ, CHIDIST, CHIINV, CHIPOWER, FDIST, FINV,
FORECAST, CONFIDENCE, NORMDIST, NORMINV, NORMSDIST, NORMSINV, RANK,
TDIST, TINV, TREND, TRIMMEAN, TTEST, VAR, ZTEST and their interpretation.

List of Reference Books:

1. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
3. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel

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Kakatiya University, Warangal
B.A/B.Sc. (Statistics) II Year, Semester-III
(CBCS) (With Mathematics Combination)
(Examination at the end of II Year, Sem-III)

Paper-III: Statistical Methods (DSC-2C)
(4 HPW :: 4 Credits :: 100 Marks)

Unit-I
Population correlation co-efficient and its properties. Bivariate data, scattered diagram, sample correlation co-efficient, computation of correlation co-efficient for grouped data. Correlation ratio, Spearman’s rank correlation co-efficient and its properties. Principle of least squares, simple linear regression, correlation versus regression, properties of regression coefficients. Concepts and computation of Partial and Multiple correlation co-efficients (for 3 variables only).

Unit-II
Fitting of quadratic and power curves. Analysis of categorical data, independence, association and partial association of attributes, various measures of association (Yule’s) for two way data and co-efficient of contingency (Pearson and Tcherprow), co-efficient 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 $\chi^2$, $t$ and $F$ distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.

Unit-IV

List of reference books:


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7. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.


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 $y = ax^b$, $y = ab^x$ and $y = ae^{bx}$ by the method of least squares.

7. Fitting of power curves of the type $y = ax^b$, $y = ab^x$ and $y = ae^{bx}$ by the method of least squares using MS Excel.


10. Computation of correlation coefficient and regression lines for ungrouped data.

11. Computation of correlation coefficient, forming regression lines for grouped data.


15. Computation of correlation ratio.
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B.A/B.Sc. (Statistics) II Year, Semester-IV
(CBCS)(With Mathematics Combination)
(Examination at the end of II Year, Sem-IV)

SEC-2
Statistical Computation Using C-Programming
(2 HPW :: 2 Credits :: 50 Marks)

Unit-I
Components of C language, Structure of a C program. Tokens, Basic data types, Enumerated
data type, Derived data types. Variables-declaration and assignment of variables; Local, Global,
Parametric variables, Numeric, Character, real and string constants. Arithmetic, relational
logical operators. Assignment operators. Increment and Decrement operators, conditional
operators, Bitwise operators. Type modifiers and expressions, writing and interpreting
expressions, using expressions in statements. Input/output statements.

Control statements, conditional statements, if..else, nesting of if..else, elseif ladder, switch
statements, loops in C: for, while, do.. while loops, Break, continue, exit( ), goto and label
declarations. One dimensional and two dimensional arrays. Functions, classification of functions,
functions definition and declaration, assessing a function, return statement.

Unit-II
Writing C programs:

1. Formation of frequency distribution table for the given raw data by setting the number of
classes and class width using functions.
2. Computation of Arithmetic Mean, Median and Mode, Standard deviation, Variance and
coe-efficient of variation, Moments, Skewness and Kurtosis for raw data and for grouped
data using functions.
3. Computation of Karl-Pearson’s coefficient of correlation and obtaining Regression lines
Y on X and X on Y.

References:
2. Programming with C: Schaum Series.
3. Let us C: Yashwant Kanitker.
4. Data structures in C: E. Balagurusamy.

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Kakatiya University, Warangal  
B.A/B.Sc. (Statistics) II Year, Semester-IV  
(CBCS)(With Mathematics Combination)  
(Examination at the end of II Year, Sem-IV)  

Paper-IV: Statistical Inference (DSC-2D)  
(4 HPW :: 4 Credits :: 100 Marks)  

Unit-I  

Concepts of statistical hypothesis, null and alternative hypotheses, 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  

Use of central limit theorem in testing, Large sample tests and confidence intervals for mean(s),  
proportion(s), standard deviation(s) and correlation coefficient(s).  

Unit-III  

Tests of significance based on $\chi^2$, t and F. $\chi^2$-test for goodness of fit and test for independence  
of attributes. Definition of order statistics and statement of their distributions.  

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  

List of Reference Books:  

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons,  
New Delhi.  
(Pvt) Ltd., Kolkata.  
7. Gibbons J.D and Subhabrata Chakraborti: Non-parametric Statistical Inference, Marcel  
Dekker.
13. K.V.S. Sarma: Statistics made simple: Do it yourself on PC, PHI.

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B.A/B.Sc. (Statistics) II Year, Semester-IV
(CBCS)(With Mathematics Combination)
(Examination at the end of II Year, Sem-IV)

Practical-4
Statistical Inference
(2 HPW :: 1 Credit :: 50 Marks)

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. \( \chi^2 \) – test for goodness of fit and independence of attributes.
8. \( \chi^2 \) – 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 run test.
10. Nonparametric tests for two independent samples (Median test, Wilcoxon Mann Whitney - U test, Wald - Wolfowitz run test)

Note: Training shall be on establishing formulae in Excel cells and deriving the results.
The Excel output shall be exported to MS Word for writing inferences.
Kakatiya University, Warangal
B.A/B.Sc. (Statistics) III Year, Semester-V
(CBCS)(With Mathematics Combination)
(Examination at the end of III Year, Sem-V)

SEC-3
Statistical Computation Using SPSS
(2 HPW :: 2 Credits :: 50 Marks)

Unit-I

An Overview of SPSS: Mouse and keyboard processing, frequently used dialog boxes, editing output. Printing results, Creating and editing a data file.

Managing Data: Listing cases, replacing missing values, computing new variables, recording variables, exploring data, selecting cases, sorting cases, merging files.

Graphs: Creating and editing graphs and charts including Cluster bar chart, Stem and leaf chart.

Unit-II

Frequencies: Frequency curves, bar charts, histograms, percentiles.

Descriptive Statistics: Measures of central tendency, variability, deviation from normality, Cross tabulation and Chi-square analysis, the means (t-test for single sample, two independent samples, paired samples and observed correlation co-efficient procedures).

Correlation and Regression: Bi-variate Correlation, Partial Correlation (for 3 variables), Simple Linear Regression, Multiple regression analysis (for 3 Variables).

Reference:


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Kakatiya University, Warangal  
B.A/B.Sc. (Statistics) III Year, Semester-V  
(CBCS)  
(Examination at the end of III Year, Sem-V)  

GE-1  
Basic Statistics-1  
(2 HPW :: 2 Credits :: 50 Marks)  

Unit-I  


Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean, their merits and demerits with examples. Partition Values: Quartiles, deciles and percentiles and examples.  

Measures of dispersion: Range, quartile deviation, standard deviation, variance and co-efficient of variation. Central and non-Central moments, coefficient of Skewness and Kurtosis and simple examples.  

Unit- II  


List of reference books:  

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B.A/B.Sc. (Statistics) III Year, Semester-V
(CBCS)(With Mathematics Combination)
(Examination at the end of III Year, Sem-V)

(3 HPW :: 3 Credits :: 75 Marks)

Unit-I

Design of 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.

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 (i) SRS(wr) and SRS(wor). (ii) Stratified random sampling with proportional and Neyman allocation (iii) Systematic sampling when \( N = nk \). Comparison of relative efficiencies. Advantages and disadvantages of above methods of sampling.

Unit-II


Unit-III

Index Numbers: Concepts, construction, uses and limitations of simple and weighted index numbers. Laspeyres', 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 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.

List of reference books:


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8. Telugu Academy: Prayoga Rachana Mariyu Visleshana.

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Practical-5
Applied Statistics-1
(2 HPW :: 1 Credit :: 50 Marks)

Sampling Techniques:
1. Estimation of Population mean, population total and variance of these estimates
   by SRS (wr) and SRS(wr).
2. Comparison between SRS(wr) and SRS(wor).
3. Stratified random sampling with proportional and optimum allocations.
4. Comparison between proportional and optimum allocations with SRS(wor).
5. Systematic sampling with \( N = nk \).
6. Comparison of Systematic sampling with Stratified and SRS(wor).

Time Series Analysis:
9. Determination of seasonal indices by the method of Ratio to trend.
10. Determination of seasonal indices by the method of Ratio to moving averages.
11. Determination of seasonal indices by the method of link Relatives.

Index Numbers:
12. Computation of all weighted indices.
14. Base shifting, splicing and deflation of Index numbers.

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**Paper-VI(A)**

**Elective-I(A): SQC and LPP (DSE-2E)**
(3 HPW :: 3 Credits :: 75 Marks)

**Unit-I**

**Statistical Quality Control:** Importance of SQC in industry, Statistical basis of Shewart control charts. Construction of control charts for variables (mean, range and standard deviation) and 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 limits and its importance.

**Unit-II**

**Acceptance sampling plans:** Concept of AQL and LTPD, Producer’s 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.

**Unit-III**

**Linear Programming:** Meaning and scope of OR, Convex sets and their properties, Definition of general LPP, Formulation of LPP, Solution of LPP by graphical method, Fundamental theorem of LPP, Simplex algorithm, Concept of artificial variables, Big -M(Penalty) method, two-phase simplex methods, Concept of degeneracy and resolving it, Concept of duality, duality in LPP, and dual primal relationships.

**List of reference books:**

5. Hadley: Linear programming, Addison-Wesley.
8. Telugu Academy: Anuvarthitha Saankhyaka Shaasthramu.

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Practical-6(A)
Elective-I(A): SQC and LPP
(Practical using MS-Excel and TORA )
(2 HPW :: 1 Credit :: 50 Marks)

Statistical Quality Control and Acceptance Sampling Plans:

1. Construction of $\bar{X}$, R and $\sigma$- charts.
2. Construction of p and np charts with fixed n.
3. Construction of p and np charts with varying n.
4. Construction of c and u charts.
5. Construction of OC and ASN curves for single and double sampling plan.

Operations Research:

6. Conversion of LPP from one form to another.
10. Writing dual and dual of dual of given LPP.

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*Paper-VI(B)*

**Elective-I(B): Bio Statistics-1 (DSE-2E)**
(3 HPW :: 3 Credits :: 75 Marks)

**Unit-I**

*Bioassay:* The purpose and structure of biological assay. Types of biological assays, direct
assays, Ratio estimates, asymptotic distributions: Feller’s theorem. Regression approach to
estimating dose-response, relationships.

**Unit – II**

Logit and Probit approaches when dose-response curve for standard preparation is unknown,
quantal responses, methods of estimation of parameters, estimation of extreme quantiles, dose
 allocation schemes, polychotomous quantal response, estimation of points on the quantal
 response function.

**Unit – III**

*Statistical Genetics:* Basic terminology of genetics. Frequencies of genes and genotypes,
Mendal’s law, Hardy-Weinberg equilibrium. Mating Frequencies, estimation of allele frequency
(dominant /co dominant cases). Multiple alleles. Approach to equilibrium for X-linked gene,
natural selection, mutation, genetic drift, equilibrium when both natural selection and mutation
are operative.

**List of reference books:**

   Panther Publishers.
7. Anil Gore and S. A. Paranjpe (2000): A course in Mathematical and Statistical Ecology,
10. James F Crow and Motoo Kimura: An Introduction to Population Genetics Theory,
    Alpha edition.

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Practical-6(B)  
Elective-I(B): Bio Statistics-1  
(2 HPW :: 1 Credit :: 50 Marks)  

2. Fitting exponential growth model to data by linearization method.  
3. Fitting logistic growth model.  
5. Dose response relation and estimation by MLE method.  
7. Estimation of points on the quantal response.  
8. Hardy–Weinberg equilibrium frequencies.  
10. Effects of mutation and selection.  

Note: The above practicals are to be carried out both (i) Manually (ii) Using MS Excel. Training shall be in establishing formulae in Excel cells and derive the results. The excel output shall be exported to MS Word for writing inference.  

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Paper-VI(C)
Elective-I(C): Actuarial Statistics-1 (DSE-2E)
(3 HPW :: 3 Credits :: 75 Marks)

Unit-I

Utility theory, insurance and utility theory, models for individual claims and their sums, survival function, curate future lifetime, force of mortality.

Unit-II

Life table and its relation with survival function examples, assumptions of fractional ages, some analytical laws of mortality select and ultimate tables.

Unit-III

Multiple life functions, joint life and last survivor status, insurance and annuity benefits through multiple life functions, evaluation for special mortality laws. Multiple decrement models, deterministic and random survivorship groups, associated single decrement tables, central rates of multiple decrement, net single premiums and their numerical evaluations.

List of Reference books:

   Actuarial Mathematics, (Society of Actuaries), Ithaca, Illinois, USA.

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**Practical-6(C)**
**Elective-I(C): Actuarial Statistics-I**
(2 HPW :: 1 Credit :: 50 Marks)

1. Computation of values of utility function.
2. Computation of various components of life tables.
3. Construction of multiple decrement table for deterministic survival group.
4. Determination of distribution function, survival function and force of mortality.
5. Construction of multiple decrement table for random survivorship group.

**Note:** The above practicals are to be carried out both (i) Manually (ii) Using MS Excel.
Training shall be in establishing formulae in Excel cells and derive the results.
The Excel output shall be exported to MS Word for writing inference.

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SEC-4
Data Mining
(2 HPW :: 2 Credits :: 50 Marks)

Unit-I

Data Mining: Definition, Knowledge Data Discovery Techniques, Applications, Mining frequent Patterns and Associations-Basic concepts, market basket analysis, definitions (with examples) of frequent item sets, closed item sets and association rules, Apriori algorithm for finding frequent item sets using candidate generation, generating association rules from frequent item sets, Mining multilevel association rules.

Unit-II

Mining Time Series Data: Trend analysis, Mining on Social Networks, Mining Customer Networks on Social Networks for Viral Marketing, Mining News groups using Networks.

List of References:


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GE-2
Basic Statistics-2
(2 HPW :: 2 Credits :: 50 Marks)

Unit-I

Random variables: Definition and simple examples of random variables, discrete and continuous r.v's, probability mass function and probability density function, Probability distribution 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 and variance only).

Unit-II


Estimation: 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.

Testing of Hypothesis: Definition of Null and Alternative hypotheses, Critical region, Types of errors, level of Significance and Power of a test.

Tests of significance :Tests of significance based on Chi-Square, t and F distributions. ANOVA of One-way and Two-way classified data with examples. (No mathematical derivation, only methodology).

List of reference books:

Kakatiya University, Warangal  
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(3 HPW :: 3 Credits :: 75 Marks)  

Unit-I  

Analysis of Variance: Statement of Cochran’s theorem, ANOVA one-way, two-way classifications with one observation per cell, Expectation of various sums of squares, Statistical analysis.  

Design of Experiments: Importance and applications of design of experiments. Principles of experimental designs, Concept of Gauss-Markoff linear model with examples, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) including one missing observation in all cases, expectation of various sum of squares. Comparison of the efficiencies of these designs.  

Unit-II  


Unit-III  

Demand Analysis: Introduction. Demand and supply, price elasticity of supply and demand. Methods of determining demand and supply curves, Leontief’s Pigou’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.  


List of reference books:  


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Practical-7
Applied Statistics-2
(2 HPW :: 1 Credit :: 50 Marks)

Designs of Experiments:

1. Analysis of CRD.
2. Analysis of RBD with and without missing observation. Comparison of RBD with CRD.
3. Analysis of LSD with and without missing observation. Comparison of LSD with RBD and CRD.

Vital Statistics:


Demand Analysis:

6. Construction of Lorenz curve.
7. Fitting of Pareto law to an income data.

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Paper-VIII(A)
Elective-II(A): Operations Research and Reliability (DSE-2F)
(3 HPW :: 3 Credits :: 75 Marks)

Unit-I

Transportation Problem: Definition of transportation problem, TP 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 methods for balanced and unbalanced transportation problems. Degeneracy in TP and resolving it. Concept of Transshipment problem.

Unit-II


Unit-III

Sequencing Problems: Problem of Sequencing. Optimal sequence of ‘n’ jobs on two and three machines without passing.


List of reference books:

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(Examination at the end of III Year, Sem-VI)

Practical-8(A)
Elective-II(A): Operations Research and Reliability
(Practical using MS-Excel and TORA)
(2 HPW :: 1 Credit :: 50 Marks)

Operations research and Reliability:

1. IBFS to balanced and unbalanced transportation problems using North-West corner rule, Matrix minimum method and Vogel’s approximation method.
2. Optimum solution to a TP by MODI and Stepping-stone methods.
3. Solution of Assignment problem for both maximization and minimization.
5. Computation of Optimal Sequence, total elapsed time and idle time for ‘n’ jobs sequencing on 2 and 3 machines.
6. Computation of System reliability for series, parallel and K out of N systems.

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Unit-I

Survival Analysis: Survival functions and hazard rates. Types of censoring and likelihood in these cases. Life distributions- Exponential, Gamma, Weibull, Lognormal, Pareto. Linear failure rate. Point estimation, confidence intervals, scores, likelihood ratio, MLE, tests for these distributions.

Unit-II


Unit-III

Quantitative Epidemiology: Introduction to modern epidemiology, principles of epidemiological investigation, surveillance and disease monitoring in populations.

Epidemiologic measures: Organizing and presenting epidemiologic data, measures of disease frequency, measures of effect and association, causation and casual inference. Design and analysis of epidemiologic studies

List of reference books:


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Practical-8(B)
Elective-II(B): Bio Statistics-2
(2 HPW :: 1 Credit :: 50 Marks)

1. Selection and the Hardy -Weinberg test.
2. Genetic drift.
3. Parameter estimation in exponential and Weibull distributions—Type-I, Type-II Censoring.
4. LR tests for exponential and Weibull distribution.

Note: The above practicals are to be carried out both (i) manually (ii) using MS Excel.
Training shall be in establishing formulae in Excel cells and derive the results.
The Excel output shall be exported to MS Word for writing inference.

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_Paper-VIII(C)  
Elective-II(C): Actuarial Statistics-2 (DSE-2F)  
(3 HPW :: 3 Credits :: 75 Marks)_

_Unit-I_

**Interest rates:** Elements of compound interest (nominal and effective rate of interest).  
**Life annuities:** single payment, continuous life annuities, discrete life annuities, life annuities with monthly payments, communication functions, varying annuities, recursions and complete annuities- immediate and apportionable annuities-due.

_Unit-II_

**Net premiums:** Continuous and discrete premiums, true monthly payment premiums, apportionate premiums, commutation functions, and accumulation type benefits.

_Unit-III_

**Net premium reserves:** continuous and discrete net premium reserve, reserves on a semi continuous basis, reserves based on true monthly premiums, reserves on an apportionable or accounted continuous basis reserves at fractional durations.

**List of Reference books:**

5. Federation of Insurance Institutes study courses: Mathematical basis of Life Assurance (F.I.21), Federation if Insurance Institutes, Bombay.
Kakatiya University, Warangal
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(CBCS)(With Mathematics Combination)
(Examination at the end of III Year, Sem-VI)

Practical-8(C)
Elective-II(C): Actuarial Statistics-2
(2 HPW :: 1 Credit :: 50 Marks)

1. Computation of compound interest (nominal and effective rate of interests).
2. Annuities and annuity dues.
4. Annuities payable more frequently than one year.
5. Complete and special annuities.
6. Office premium.
7. Assurances payable at the moment of death.

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Training shall be in establishing formulae in Excel cells and derive the results.
The Excel output shall be exported to MS Word for writing inference.

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