DSC-1/Paper-1: **Descriptive Statistics and Probability**
[4 HPW:: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Descriptive Statistics: Concepts of primary and secondary data, Methods of collection, 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, Moments and their Importance, 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.

Unit-II

Probability: Basic concepts, deterministic and random experiments, trial, outcome, sample space, event, operations on events, mutually exclusive and exhaustive events, equally likely and favourable events, 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'(≥2) events, Boole's inequality and Bayes' theorem, Problems on applications of Bayes' theorem.

Unit-III

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function (pmf), probability density function (pdf) with illustrations, Probability Distribution function and its properties, Transformation of one-dimensional random variable (simple 1-1 functions only), Notion of bi-variate random variable, bi-variate distribution and its properties , Joint, marginal and conditional distributions, Independence of random variables**.**

Unit-IV

Mathematical Expectation: Expectation of random variable, a function of a random variable, Raw and Central moments, Covariance using mathematical expectation (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 their properties, Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

References:
1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
3. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
4. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI

***

Practical-1
Descriptive Statistics and Probability
(3 HPW :: 1 Credit :: 25 Marks)

Part-1 (Using Calculator)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives). s
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of non-central and central moments – Sheppard☐s corrections for grouped data.
4. Computation of coefficients of Skewness and Kurtosis ☐ Karl Pearson's, Bowley's, β_1 and β_2.

Part-2 (Using MS-Excel)

1. Basics 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.
2. Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS-Excel
3. Diagrammatic presentation of data (Bar and Pie) using MS-Excel
4. Computation of Measures of central tendency, dispersion, Coefficient of Variation and coefficients of Skewness, Kurtosis using MS-Excel.

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Question Papers Pattern

(A) Final Examination: KAKATIYA UNIVERSITY
                                            B.Sc. (STATISTICS)
                                            Theory Question Paper Pattern
                                            Academic Years: 2019-2022

Time: 3 hours]   [Max. Marks: 80

Section - A
Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

Q1. (a)
          [OR]   From Unit-I
Q1. (b)

Q2. (a)
          [OR]   From Unit-II
Q2. (b)

Q3. (a)
          [OR]   From Unit-III
Q3. (b)

Q4. (a)
          [OR]   From Unit-IV
Q4. (b)

Section - B
Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6   } From Unit-I
Q7

Q8
Q9   } From Unit-II
Q10

Q11
Q12   } From Unit-III
Q13

Q14
Q15   } From Unit-IV
Q16

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B.Sc. (STATISTICS)

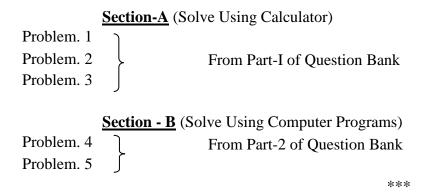**Practical Question Paper Pattern**
Academic Years: 2019-2022

Time: 2 hours]   **[Max. Marks: 25**

[Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

<u>**Section-A**</u> (Solve Using Calculator)

Problem. 1

Problem. 2   From Part-I of Question Bank

Problem. 3

<u>**Section - B**</u> (Solve Using Computer Programs)

Problem. 4   From Part-2 of Question Bank

Problem. 5

                                                                                    ***

(B)   Internal Examinations:

1   Two Internal exams are to be conducted and best of two internal marks is considered.
2   First internal exam is to be conducted after completion of Unit-I &II.
3   Second internal exam is to be conducted after completion of Unit-III & IV.
4   Internal Examination duration: 1 hr 30 min.
5   Internal Theory QP consists of 20 marks.
6   10 Short questions are to be given (5Q from each of 2 Completed units).
7   All TEN questions are to be answered (10QX2m=20m).

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Chairperson, BOS in Statistics, KU

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS AY: 2019-2022)
B.Sc. STATISTICS
I Year :: Semester-II

DSC-2/Paper-2: **Probability Distributions**
[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Discrete distributions-I: Uniform and Bernoulli distributions and their properties, functions and properties such as mean, median, mode, moments upto fourth order, moment generating function(m.g.f), cumulants upto fourth order, cumulant generating function(c.g.f), mean, variance and simple examples, derivation of probability mass(p.m.f), probability generating function(p.g.f), characteristic function(c.f), reproductive property (wherever exists) and their real life applications of of: Binomial distribution, Poisson distribution. Poisson approximation to Binomial distribution.

Unit-II

Discrete distributions-II: Negative binomial, Geometric, Hyper-geometric distribution distributions and their properties, Definitions and real life applications, properties of these distributions such as mean, variance, 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, Poisson approximation to Negative binomial distribution, Binomial approximation to Hyper-geometric distribution.

Unit-III

Continuous distributions-I: Rectangular and Normal distributions: definition, properties such as mean, variance, moments upto fourth order, m.g.f., c.g.f., c.f., reproductive property (wherever exists) and their real life applications. Normal distribution as a limiting case of Binomial and Poisson distributions. All properties of Normal distribution with examples.

Unit-IV

Continuous distributions-II: Exponential, Gamma distributions: definition, properties, m.g.f., c.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Beta distribution of two kinds: Definitions, mean and variance. Cauchy distribution, its definition and c.f.

Definition of convergence in Law, Convergence in Probability and Almost sure convergence. Definitions of Weak Law of Large Numbers (WLLN), Strong Law of Large numbers (SLLN), Central Limit Theorem (CLT) with simple examples. CLT for identically and independently distributed (i.i.d) random variables with finite variance.

References:
1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
3. Goon A M, Gupta M K, Das Gupta B : Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
4. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI

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Practical-2
Probability Distributions
(3 HPW :: 1 Credit :: 25 Marks)

Part-1 (Using Calculator)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Binomial distribution-Recurrence relation Method.
3. Fitting of Poisson distribution-Direct method
4. Fitting of Poisson distribution-Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution-Areas method.
8. Fitting of Normal distribution - Ordinates method.

Part-2 (Using MS-Excel)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Poisson distribution-Direct method.
3. Fitting of Normal distribution-Areas method.
4. Fitting of Exponential distribution.
5. Fitting of Cauchy distribution.

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Question Papers Pattern

(A) **Final Examination:**   KAKATIYA UNIVERSITY
                             B.Sc. (STATISTICS)
                        Theory Question Paper Pattern
                        Academic Years: 2019-2022

Time: 3 hours]   [Max. Marks: 80

Section - A
Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

Q1. (a)
        [OR]   From Unit-I
Q1. (b)

Q2. (a)
        [OR]   From Unit-II
Q2. (b)

Q3. (a)
        [OR]   From Unit-III
Q3. (b)

Q4. (a)
        [OR]   From Unit-IV
Q4. (b)

Section - B
Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6   From Unit-I
Q7

Q8
Q9   From Unit-II
Q10

Q11
Q12   From Unit-III
Q13

Q14
Q15   From Unit-IV
Q16

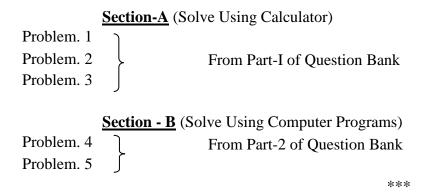   ***

KAKATIYA UNIVERSITY

B.Sc. (STATISTICS)

Practical Question Paper Pattern
Academic Years: 2019-2022

Time: 2 hours]   **[Max. Marks: 25**

[Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

<u>Section-A</u> (Solve Using Calculator)

Problem. 1
Problem. 2   From Part-I of Question Bank
Problem. 3

<u>Section - B</u> (Solve Using Computer Programs)

Problem. 4   From Part-2 of Question Bank
Problem. 5

***

(B)   Internal Examinations:

1   Two Internal exams are to be conducted and best of two internal marks is considered.
2   First internal exam is to be conducted after completion of Unit-I &II.
3   Second internal exam is to be conducted after completion of Unit-III & IV.
4   Internal Examination duration: 1 hr 30 min.
5   Internal Theory QP consists of 20 marks.
6   10 Short questions are to be given (5Q from each of 2 Completed units).
7   All TEN questions are to be answered (10QX2m=20m).

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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS AY: 2020-2021 on words)
B.Sc. STATISTICS
II Year: Semester-III

DSC-3/Paper-3: STATISTICAL METHODS AND THEORY OF ESTIMATION

[4 HPW:: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Bi-variate data, Scattered diagram, Principle of least squares, fitting of straight line, quadratic and power curves. Concept of correlation, computation of Karl-Pearson correlation coefficient for grouped and ungrouped data and its properties, Correlation ratio, Spearman's rank correlation coefficient and its properties. Simple linear regression, correlation verses regression, properties of regression coefficients, their relation with correlation coefficient.

Unit-II

Concepts of partial and multiple correlation coefficients (only for three variables), Analysis of categorical data, their independence, Association and partial association of attributes, various measures of association, Yule's for two way data, 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 means and that of sample proportions, Exact sampling distributions: Statement and properties of χ^2, t and F distributions and their inter-relationships. Independence of sample mean and variance in random sampling from normal distribution.
Point estimation of a parameter, concept of bias and mean square error of an estimate. Criteria of a 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 the method of moments(MOM), Maximum likelihood estimation (MLE), Asymptotic properties of MLE (Statements without proofs), Concept of interval estimation, Confidence intervals of the parameters of normal population by Pivot method.

References:

1. Goon AM, Gupta MK, Das Gupta B : Outlines of Statistics , Vol-II,

   The World Press Pvt. Ltd., Kolkata.

2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics,

    Sultan Chand & Sons, New Delhi.

3. Hogg and Craig : Introduction to Mathematical statistics. Prentice Hall

4. Parimal Mukhopadhyay : Mathematical Statistics, New Central Book agency.

5. V. K. Rohatgi and A. K. Md. Ehsanes Saleh : An introduction to probability and statistics, Wiley series.

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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS AY: 2020-2021 on words)
B.Sc. STATISTICS
II Year: Semester-III

Practical-3: *STATISTICAL METHODS AND THEORY OF ESTIMATION*
(3 HPW, Credits 1 and Marks 25)

Part-A (Using Calculator)

1. Generation of random samples from Uniform (0,1), Uniform (a,b), Normal and Poisson and Exponential Distributions.

2. Fitting of straight line and parabola by the method of least squares.

3. 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.

4. Computation of Yule's coefficient of association and Pearson's, Tcherprows coefficient of contingency.

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

6. Computation of correlation coefficient, forming regression lines for ungrouped data.

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

8. Computation of multiple and partial correlation coefficients.

9. Computation of correlation ratio

Part-B (Using MS-Excel)

10. Simulation of random samples from Uniform (0,1), Uniform (a,b), Exponential, Normal and Poisson distributions using MS Excel.

11. Fitting of straight line and parabola by the method of least squares using MS Excel.

12. 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.

13. Computation of correlation coefficient, forming regression lines using MS Excel.

14. Computation of multiple and partial correlation coefficients using MS Excel.

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Question Papers Pattern

(A) **Final Examination:** KAKATIYA UNIVERSITY
B.Sc. (STATISTICS)
Theory Question Paper Pattern
Academic Years: 2019-2022

Time: 3 hours]   [Max. Marks: 80

Section - A
Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

Q1. (a)
         [OR]   From Unit-I
Q1. (b)

Q2. (a)
         [OR]   From Unit-II
Q2. (b)

Q3. (a)
         [OR]   From Unit-III
Q3. (b)

Q4. (a)
         [OR]   From Unit-IV
Q4. (b)

Section - B
Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6   From Unit-I
Q7

Q8
Q9   From Unit-II
Q10

Q11
Q12   From Unit-III
Q13

Q14
Q15   From Unit-IV
Q16

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B.Sc. (STATISTICS)
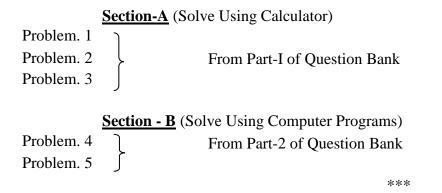
Practical Question Paper Pattern
Academic Years: 2019-2022

Time: 2 hours]   **[Max. Marks: 25**

[Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

Section-A (Solve Using Calculator)

Problem. 1

Problem. 2   From Part-I of Question Bank

Problem. 3

Section - B (Solve Using Computer Programs)

Problem. 4   From Part-2 of Question Bank

Problem. 5

***

(B) Internal Examinations:

1 Two Internal exams are to be conducted and best of two internal marks is considered.
2 First internal exam is to be conducted after completion of Unit-I &II.
3 Second internal exam is to be conducted after completion of Unit-III & IV.
4 Internal Examination duration: 1 hr 30 min.
5 Internal Theory QP consists of 20 marks.
6 10 Short questions are to be given (5Q from each of 2 Completed units).
7 All TEN questions are to be answered (10QX2m=20m).

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DSC-4/Paper-4: STATISTICAL INFERENCE
[4 HPW: 4 Credits: 100 Marks (External: 80, Internal: 20)]

Unit-I

Concepts of statistical hypotheses: Null and Alternative hypothesis, Critical region, two types of error, Level of significance and Power of a test, One and two tailed tests, test function (non-randomized and randomized), Statement and Proof of Neyman-Pearson's fundamental lemma for Randomized tests, Examples in case of Binomial, Poisson, Exponential and Normal distributions and their power of the test functions.

Unit-II

Large sample tests: Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions 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 their distributions (statements only).

Unit-III

Tests of significance: Tests based on χ^2 distribution, χ^2-test for specified variance, goodness of fit and test for independence of attributes (rxs, 2xk and 2x2 contingency tables). Tests of significance based on student's t distribution, t-test for single sample specified mean, difference of means for independent and related samples, sample correlation coefficient, F-test for equality of population variances.

Unit-IV

Non-parametric tests: Various non-parametric tests. their advantages and disadvantages, comparison with parametric tests, Measurement scale: nominal, ordinal, interval and ratio, Use of Central Limit Theorem in testing, one sample runs test, sign test and Wilcoxon-signed rank test (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.

References:

1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi
3. Hogg and Craig : Introduction to Mathematical statistics, Prentice Hall
4. Parimal Mukhopadhyay : Mathematical Statistics, New Central Book agency.

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Practical-4: STATISTICAL INFERENCE

[3 HPW, Credits 1 and Marks 25]

Part-A (Using Calculator)

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 test for single and difference of variances.

5. $\chi2$ – test for goodness of fit and independence of attributes.

6. Nonparametric tests for two independent samples (Median test, Wilcoxon-Mann-Whitney U-test, Wald - Wolfowitz's runs test)

Part-B (Using MS-Excel)

7. Use of Look up and Reference functions for data analysis.

8. Creating and assigning Macros.

9. Small sample tests for mean(s), paired t-test and correlation coefficient using MS Excel.

10. Small sample test for single and difference of variances using MS Excel.

11. $\chi2$ – test for goodness of fit and independence of attributes using MS Excel.

12. Nonparametric tests for single and related samples (sign test and Wilcoxon signed rank test) and one sample runs 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.

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Question Papers Pattern

(A) **Final Examination:** KAKATIYA UNIVERSITY
B.Sc. (STATISTICS)
Theory Question Paper Pattern
Academic Years: 2019-2022

Time: 3 hours] [Max. Marks: 80

Section - A
Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

Q1. (a)
      [OR]   From Unit-I
Q1. (b)

Q2. (a)
      [OR]   From Unit-II
Q2. (b)

Q3. (a)
      [OR]   From Unit-III
Q3. (b)

Q4. (a)
      [OR]   From Unit-IV
Q4. (b)

Section - B
Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6   From Unit-I
Q7

Q8
Q9   From Unit-II
Q10

Q11
Q12   From Unit-III
Q13

Q14
Q15   From Unit-IV
Q16

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B.Sc. (STATISTICS)

Practical Question Paper Pattern
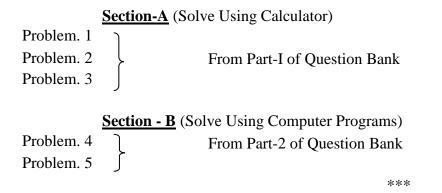**Academic Years: 2019-2022**

Time: 2 hours]   **[Max. Marks: 25**

[Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

Section-A (Solve Using Calculator)

Problem. 1 ⎫
Problem. 2 ⎬   From Part-I of Question Bank
Problem. 3 ⎭

Section - B (Solve Using Computer Programs)

Problem. 4 ⎫   From Part-2 of Question Bank
Problem. 5 ⎭

                                                    ***

(B)   Internal Examinations:

1   Two Internal exams are to be conducted and best of two internal marks is considered.
2   First internal exam is to be conducted after completion of Unit-I &II.
3   Second internal exam is to be conducted after completion of Unit-III & IV.
4   Internal Examination duration: 1 hr 30 min.
5   Internal Theory QP consists of 20 marks.
6   10 Short questions are to be given (5Q from each of 2 Completed units).
7   All TEN questions are to be answered (10QX2m=20m).

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Chairperson, BOS in Statistics, KU

DSE-1(A)/Paper-5 (A): Applied Statistics-I
[4 HPW:: 4 Credits :: 100 Marks (External : 80, Internal : 20)]

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, population total, and population proportion, their variances and the estimates of variances in methods of: (i) Stratified Random Sampling with Proportional and Neyman allocation (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

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, Construction of control charts for attributes: p, np with fixed and varying sample sizes and their interpretation, c and u charts with fixed and varying sample sizes and their interpretation.

References:

1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansilal :New Mathematical Statistics, Satya Prakashan , New Delhi
3. Hogg and Craig : Introduction to Mathematical statistics, Prentice Hall
4. Parimal Mukhopadhyay : Mathematical Statistics, New Central Book agency.
5. Anuvartita Sankhyaka Sastram , Telugu Academy.

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Practical-5 (A) : Applied Statistics - I
[With 3 HPW, Credits 1 and 25 Marks]

Practical (using R-Software and MS- Excel)

R- Software : Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Running R, Packages in R, Variable names and assignment, Operators, Integers, Factors, Logical operations. Operations of Scalars, Vectors, Lists, Arrays, Matrices, Data Frames. Control structures, Functions.

1. Data Visualization using R - Frequency polygons and curves, Ogives, Histogram using R.

2. Data Visualization using R - Bar diagrams (simple, compound, percentage and multiple) and Pie diagram (single and multiple) using R.

3. Computation of Descriptive Statistics using R (Measures of Central tendencies and Dispersion, Moments, Skewness and Kurtosis) using R.

4. Computation of expected frequencies for Binomial, Poisson, Normal and Exponential distributions using R.

5. Computation of Karl Pearson's coefficient of correlation and rank correlation using R.

6. Computation of partial and multiple correlations using R.

7. Time series Analysis: Computation of Secular trend by least squares and moving averages methods using R and MS-Excel.

8. Computation of Seasonal variations by Ratio to moving averages, Ratio to trend and Link Relatives methods using R and MS-Excel.

9. Construction of control charts for variables ($\bar{x}$, **R** and σ - charts) using R and MS – Excel.

10. Construction of control charts for attributes (p, np with fixed and varying sample size, C and u charts) using R and MS- Excel.

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DSE-1(B)/Paper- 5 (B): Analytical Statistics-I
[4 HPW :: 4 Credits :: 100 Marks (External : 80, Internal : 20)]

UNIT-I
Sample Surveys : Principal steps in sample surveys, census versus sample surveys, sampling and non- sampling errors, advantages and limitations of sampling.

Sampling Methods: Types of sampling : Subjective, Quota, probability and mixed sampling methods. Methods of drawing random samples with and without replacement. Estimates of population mean and total, their variances and the estimates of variances in Simple Random Sampling With and Without Replacement, Stratified Random Sampling with Proportional and Neyman optimum allocation and Systematic Sampling when N= nk.

UNIT-II
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-III
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, c and u- charts with fixed and varying sample sizes). Interpretation of control charts.

UNIT-IV
Analysis of Variance and Design of Experiments: Concept of Gauss-Markov linear model with examples, statement of Cochran's theorem, ANOVA , one-way, two-way classifications with one observation per cell, Statistical analysis, Importance and applications of design of experiments, Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square design (LSD) including one missing observation.

References:

1. S.C.Gupta and V.K.Kapoor: Fundamentals of Applied Statistics, Sultan Chand

2. B. L. Agarwal : Basic Statistics, New Age publications.

3. S. P. Gupta : Statistical Methods. Sultan Chand and Sons.

4. Parimal Mukhopadhyay : Applied Statistics, New Central Book agency.

5. Daroga Singh and Chowdhary : Theory and Analysis of Sample survey designs. Wiley Eastern.

6. M. R. Saluja : Indian Official Statistics. ISI publications.

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Practical - 5 (B): Analytical Statistics – I
[With 3 HPW, Credits 1 and 25 Marks]

Practical (using R-Software)

R- Software : Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Running R, Packages in R, Variable names and assignment, Operators, Integers, Factors, Logical operations. Operations of Scalars, Vectors, Lists, Arrays, Matrices, Data Frames. Control structures, Functions.

1. Data Visualization using R - Frequency polygons and curves, Ogives, Histogram.

2. Data Visualization using R - Bar diagrams (simple, compound, percentage and multiple) and Pie diagram (single and multiple).

3. Computation of Descriptive Statistics using R (Measures of Central tendencies and Dispersion, Moments, Skewness and Kurtosis).

4. Computation of expected frequencies for Binomial, Poisson using R.

5. Computation of expected frequencies of Normal and Exponential distributions using R.

6. Computation of Karl Pearson's coefficient of correlation and rank correlation using R.

7. Computation of partial and multiple correlations using R.

8. Analysis of Variance for one way and two way classified data using R.

9. Analysis of Variance for CRD and RBD two way classified data using R.

10. Time series Analysis: Computation of Secular trend by least squares and moving averages methods using R.

11. Computation of Seasonal variations by Ratio to moving averages, Ratio to trend and Link Relatives methods using R.

12. Construction of control charts for variables ($\bar{x}$, **R** and σ - charts) using R.

13. Construction of control charts for attributes (p, np with fixed and varying sample size, C and u charts) using R.

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Question Papers Pattern

(A) **Final Examination:** KAKATIYA UNIVERSITY
B.Sc. (STATISTICS)
Theory Question Paper Pattern
Academic Years: 2019-2022

Time: 3 hours]   [Max. Marks: 80

Section - A

Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

Q1. (a)
         [OR]   From Unit-I
Q1. (b)

Q2. (a)
         [OR]   From Unit-II
Q2. (b)

Q3. (a)
         [OR]   From Unit-III
Q3. (b)

Q4. (a)
         [OR]   From Unit-IV
Q4. (b)

Section - B

Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6   }   From Unit-I
Q7

Q8
Q9   }   From Unit-II
Q10

Q11
Q12   }   From Unit-III
Q13

Q14
Q15   }   From Unit-IV
Q16

***

KAKATIYA UNIVERSITY
B.Sc. (STATISTICS)

Time: 2 hours]   **[Max. Marks: 25**

                                              [Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

Section-A (Solve Using Calculator)

Problem. 1

Problem. 2   From Part-I of Question Bank

Problem. 3

Section - B (Solve Using Computer Programs)

Problem. 4   From Part-2 of Question Bank

Problem. 5

                                              ***

(B) Internal Examinations:

1   Two Internal exams are to be conducted and best of two internal marks is considered.
2   First internal exam is to be conducted after completion of Unit-I &II.
3   Second internal exam is to be conducted after completion of Unit-III & IV.
4   Internal Examination duration: 1 hr 30 min.
5   Internal Theory QP consists of 20 marks.
6   10 Short questions are to be given (5Q from each of 2 Completed units).
7   All TEN questions are to be answered (10QX2m=20m).

                              Prof A Rajendra Prasad
                              Chairperson, BOS in Statistics, KU

DSE-2(A)/Paper-6(A): Applied Statistics-II

[4 HPW :: 4 Credits :: 100 Marks (External : 80, Internal : 20)]

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 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) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies for 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

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

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.

References:

1. V.K. Kapoor and S.C. Gupta : Fundamentals of Applied Statistics. Sultan Chand

2. A. M. Goon, M. K. Gupta, B. Das Gupta : Fundamentals of Statistics,Vol - II
   World Press Private Ltd, Calcutta

3. A. M. Goon, M. K. Gupta, B. Das Gupta : An outline of Statistical Theory, Vol- II,
   World Press Private Ltd,Calcutta-17.

***

Practical-6(A): Applied Statistics - II
[with 3 HPW, Credits 1 and Marks 25]

Practical (using R-Software and MS-Excel)

1. Generation Random Samples from the Uniform, Binomial, Poisson, Normal and Exponential distributions using R.

2. Fitting of straight line, parabola and power curves of the type $y = ax^b$, $y = ab^x$ and $y = a\,e^{bx}$ using R.

3. Large sample tests : Testing population means, proportions, variances based on single and two samples using R.

4. Parametric Tests : Testing means, variances based on single and two samples using R.

5. Tests based on χ^2 distribution using R.

6. Nonparametric Tests : one sample run test, Sign test and Wilcoxon signed rank test for one and two samples using R.

7. Nonparametric Tests : Median test, Wilcoxon-Mann Whitney U-test, Wald-wolfowitz's runs test using R.

8. Analysis of Variance for CRD and RBD data using R and MS - Excel.

9. Analysis of Variance for RBD without and with one missing observation using R and MS - Excel.

10. Analysis of Variance for LSD without and with one missing observation using R and MS - Excel.

11. Computation of Morality rates, Fertility rates and Reproduction rates using MS-Excel.

12. Construction of life tables using MS-Excel.

***

DSE-2(B)/Paper-6 (B) : Analytical Statistics-II
[4 HPW:: 4 Credits :: 100 Marks (External : 80, Internal : 20)]

Unit-I
Multivariate distributions: Introduction, concept of Multivariate, Definitions and Statements of properties of Multinomial and Multivariate Normal Distributions.

Regression Analysis: Definition, procedure of Least square estimation, methods of analysis and interpretation, Simple Linear Regression and Multiple Linear Regression for 'n' variables : estimation of parameters, Lack of fit, Mean Square Error, R^2 and adjusted R^2 values, Testing Regression coefficients.

Logistic regression: Definition and model assumptions, estimation of parameters, statements of properties for simple and Multiple Logistic regression. Interpretation of the same.

Unit-II
Multivariate Data Analysis Techniques : Definitions, Statements of properties of Principal Component Analysis, Factor Analysis, Cluster analysis and Linear Discriminant Analysis (Bayesian and Fisher's approaches), Multi-dimensional Scaling, Applications and interpretation of above techniques to Image processing / pattern recognition.
(In first two Units emphasis will be on concepts and applications of techniques only.)

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

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.

References:

1. E-Book : https://onlinelibrary.wiley.com/doi/book/10.1002/9781118391686

2. V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand

3. Johnson and Wrichon : Multivariate Analysis.

4. Pratirupa Sidhanthamulu , Telugu Academy,

5. Prayoga Rachana and Visleshana, Telugu Academy.

***

Practical-6 (B): Analytical Statistics - II
[with 3 HPW, Credits 1 and Marks 25]

Practical (using R-Software)

1. Generation Random Samples from the Uniform, Binomial, Poisson, Normal and Exponential distributions using R.

2. Fitting of straight line, parabola and power curves of the type $y = a x^b$, $y = a b^x$ and $y = a e^{bx}$ using R.

3. Large sample tests : Testing population means, proportions, variances based on single and two samples and tests based on χ^2 distribution using R.

4. Parametric Tests : Testing means, variances based on single and two samples using R.

5. Nonparametric Tests : one sample run test, Sign test and Wilcoxon sign rank test for one and two samples, Median test, Wilcoxon Mann Whitney - U test, Wald - Wolfowitz's runs test using R.

6. Principal Component Analysis using R.

7. Factor Analysis using R.

8. Cluster analysis and Linear Discriminant analysis using R.

9. Model fitting by Simple and Multiple Linear Regression methods using R.

10. Model fitting by simple Logistic regression using R.

11. Computation of Morality rates, Fertility rates and Reproduction rates using R.

12. Construction of life tables using R.

***

Question Papers Pattern

(A) Final Examination: KAKATIYA UNIVERSITY
B.Sc. (STATISTICS)
Theory Question Paper Pattern
Academic Years: 2019-2022

Time: 3 hours]   [Max. Marks: 80

Section - A
Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

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       [OR]   From Unit-I
Q1. (b)

Q2. (a)
       [OR]   From Unit-II
Q2. (b)

Q3. (a)
       [OR]   From Unit-III
Q3. (b)

Q4. (a)
       [OR]   From Unit-IV
Q4. (b)

Section - B
Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

Q5
Q6 } From Unit-I
Q7

Q8
Q9 } From Unit-II
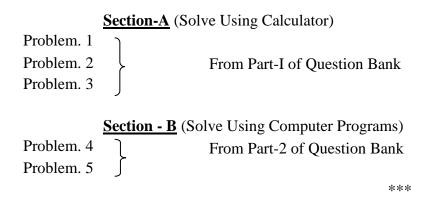Q10

Q11
Q12 } From Unit-III
Q13

Q14
Q15 } From Unit-IV
Q16

***

B.Sc. (STATISTICS)
Practical Question Paper Pattern
Academic Years: 2019-2022

Time: 2 hours]   **[Max. Marks: 25**

[Practical:15, Record:5, Viva:5]

Note: Solve any THREE problems choosing at least one from each Section

Section-A (Solve Using Calculator)

Problem. 1

Problem. 2   From Part-I of Question Bank

Problem. 3

Section - B (Solve Using Computer Programs)

Problem. 4   From Part-2 of Question Bank

Problem. 5

***

(B)   **Internal Examinations:**

1   Two Internal exams are to be conducted and best of two internal marks is considered.
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