

**KAKATIYA UNIVERSITY**  
**U.G. Skill Enhancement Course - IV**  
**(Under CBCS)**  
**B.Sc. Final Year**  
**SEMESTER - VI**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**QUANTITATIVE APTITUDE TEST**

**Credits: 2**

**Theory: 2 hours/week**

**Marks - 40**

**Unit – I ARITHMETICAL ABILITY**

**1.1 Arithmetical Ability: Ratio & Proportion**

**1.2 Arithmetical Ability: Time & Work, Time & Distance**

**1.3 Arithmetical Ability: Simple Interest, Compound Interest**

**1.4 Arithmetical Ability: Stocks & Shares**

**Unit – II DATA INTERPRETATION**

**2.1 Data Interpretation: Tabulation**

**2.2 Data Interpretation: Bar Graphs**

**2.3 Data Interpretation: Pie Charts**

**2.4 Data Interpretation: Line Graphs**

**Text Book: Quantitative Aptitude by Dr. R.S. Aggarwal**

**KAKATIYA UNIVERSITY**  
**U.G. B.Sc. Final Year (Under CBCS)**  
**Semester – VI: Generic Elective Paper-II**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

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**WATER RESOURCES MANAGEMENT**

**UNIT-I**

1. Importance of Natural Resources – Different Types Resources
2. Significance of Water Resources and their uses
3. Conservation of water and recycling of the water – Global distribution of water
4. Water shed programmes and their management
5. Storing the rain water in tanks and recharging ground water.

**Unit-II**

6. Rain water harvesting in rural areas (chekdam, trenches etc.,)
7. Over use of surface and ground water and control measures.
8. Aims, objectives and implementation of Mission Bhagiratha (Telangana Government Drinking water programme )
9. Aims, objectives and implementation of Mission Kakatiya (Telangana Government minor irrigation programme)
10. Issues and challenges in Water Resources Management

**KAKATIYA UNIVERSITY**  
**U.G. Statistics (Under CBCS)**  
**B.Sc. Final Year (DSC-1F)**  
**SEMESTER – VI**

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## **Applied Statistics-2**

### **Unit-I**

**Analysis of Variance:** Statement of Cochran's theorem, ANOVA of one-way, two-way and three way classifications with one observation per cell, Expectation of various sums of squares, Statistical analysis of one-way, two-way and three way classified data with one observation per cell.

### **Unit-II**

**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-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 and Net reproductive rate, Life tables, construction and uses of life table and Abridged life table.

### **Unit-IV**

**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.

**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.

#### **List of reference books:**

1. V. K. Kapoor and S. C. Gupta: Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
2. Parimal Mukhopadhyay: Applied Statistics, New Central Book agency.
3. M. R. Saluja: Indian Official Statistics, ISI publications.
4. B. L. Agarwal: Basic Statistics, New Age publications.
5. S. P. Gupta: Statistical Methods, Sultan Chand & Sons, New Delhi.
6. Telugu Academy: Praturupa Sidhanthaalu.

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**Applied Statistics-2 Practical**

**(2 HPW:: 1 Credit :: 25 Marks)**

**Analysis of Variance:**

1. Analysis of one-way
2. Analysis of two-way
3. Analysis of three-way

**Designs of Experiments:**

4. Analysis of CRD.
5. Analysis of RBD with and without missing observation. Comparison of RBD with CRD.
6. Analysis of LSD with and without missing observation. Comparison of LSD with RBD and CRD.

**Vital Statistics:**

7. Computation of Morality rates, Fertility rates and Reproduction rates.
8. Construction of life table and abridged life table.

**Demand Analysis:**

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

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**SEMESTER – VI**

***Elective-II***

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**(A): Operations Research and Reliability**

**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**

**Assignment Problem:** Formulation and description of Assignment problem and its variations. Assignment problem as special case of TP and LPP. Unbalanced assignment problem, Travelling salesman problem. Optimal solution using Hungarian method.

**Unit-III**

**Sequencing Problems:** Problem of Sequencing, Johnson's method for Optimal sequence of 'n' jobs on k machines where  $k = 2, 3, \dots, n$  without passing.

**Unit-IV**

**Reliability:** Concepts of reliability, Hazard function, Exponential distribution as life model, its memory-less property. Reliability function and its estimation. System reliability - series, parallel and k out of N systems and their reliabilities.

**List of reference books:**

1. Kanti Swaroop, P.K.Gupta and Man Mohan: Operations Research, Sultan Chand & Sons.
2. S. K. Sinha: Reliability and life testing, Wiley Eastern.
3. L. S. Srinath: Reliability Engineering, Affiliated East-West Press.
4. Wayne L. Winston: Operations Research, Thomson India (4<sup>th</sup> edition).
5. Taha: Operations Research: An Introduction, Mac Millan.
6. Chandrasekhar Salimath and Bhupender Parashar : O.R. Models and Methods, University Press.

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***Elective-II***

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**(A): Operations Research and Reliability Practical**  
**(Practical using MS-Excel and TORA)**  
**(2 HPW:: 1 Credit :: 25 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.
4. Solution of travelling salesman problem.
5. Computation of Optimal Sequence, total elapsed time and idle time for 'n' jobs on k machines where  $k = 2, 3, \dots, n$ .
6. Computation of System reliability for series, parallel and K out of N systems.

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***Elective-II***

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***(B): Bio Statistics-2***

**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**

**Life Tables and ageing Process:** Life tables, failure rates, mean residual life and their elementary properties, Aging classes and their properties, Bathtub failure rate. Estimation of survival function. Actuarial estimator, Kaplan-Meier estimator, estimation under the assumption of IFR/ DFR. Tests of exponentiality against nonparametric classes, total time on test.

**Unit-III**

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

**Unit-IV**

**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:**

1. Cox D. R. and Oakes D. (1984): Analysis of Survival data, Chapman & Hall.
2. Miller R.G. (1981): Survival Analysis, John Wiley.
3. Anil Gore and S. A. Paranjpe (2000): A Course in Mathematical and Statistical Ecology, Kulwer Academic Publishers.
4. Rielon E.C (1977): An introduction to Mathematical Ecology, Wiley.
5. J. F. Lawless: Statistical Models and Methods of Life data, Wiley.
6. James F Crow and Motoo Kimura: An Introduction to Population Genetics Theory.

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**SEMESTER – VI**

***Elective-II***

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**(B): Bio Statistics-2 Practical**  
(2 HPW:: 1 Credit :: 25 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.
5. Actuarial method of estimation.
6. Kaplan-Meier estimator.

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**SEMESTER – VI**

***Elective-II***

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***(C): Actuarial Statistics-2***

**Unit-I**

**Interest rates:** Elements of compound interest (nominal and effective rate of interest) with simple examples.

**Unit-II**

**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-III**

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

**Unit-IV**

**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:**

1. N. L. Bowers, H. U. Gerber, J. C. Hickman, D. A. Jones and C. J. Nesbitt (1986):  
Actuarial Mathematics, (Society of Actuaries), Ithaca, Illinois, USA .
2. Neill A (1977): Life Contingencies, Heineman.
3. Spurgeon E.T (1972): Life Contingencies, Cambridge University Press.
4. Benjamin B and Pollard J.H (1980): Analysis of Mortality and other Actuarial Statistics.
5. Federation of Insurance Institutes study courses: Mathematical basis of Life Assurance (F.I.21), Federation if Insurance Institutes, Bombay.

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***Elective-II***

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***(C): Actuarial Statistics-2 Practical***  
(2 HPW: 1 Credit: 25 Marks)

1. Computation of compound interest (nominal and effective rate of interests).
2. Annuities and annuity dues.
3. Computation of discrete and continuous net premiums.
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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