

SRI VENKATESWARA UNIVERSITY : TIRUPATI
STATISTICS MINOR SYLLABUS FOR V SEMESTER

Academic year 2025-26

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
III	V	5	Applied Statistics	3	3
			Applied Statistics Practical Course	2	1
		6	Operations Research	3	3
			Operations Research Practical Course	2	1

Course 5: Applied Statistics

I. Learning Outcomes

After learning this course, the student will be able to know about

1. Forecasting Techniques and its applications.
2. Interpret and use a range of index numbers commonly used in the business sector.
3. Perform calculations involving simple and weighted index numbers.
4. Understand the basic structure of the Consumer price index and perform calculations involving its use.
5. Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation,
6. Construction and implementation of life tables.
7. Population growth curves, population estimates and projections,
8. Real data implementation of various demographic concepts as outlined above through practical assignments.

II. Syllabus

Unit – 1: Time Series

Time Series and its components with illustrations, additive, multiplicative and mixed models. Trend – Estimation of trend by free hand curve method, method of Semi Averages. Determination of trend by Leastsquares (Linear trend, parabolic trend only), Moving averages method.

Unit – 2: Seasonal Component

Determination of seasonal indices by Simple Averages method, Ratio to Moving Average, Ratio to Trend and Link Relative methods, Deseasonalization.

Unit – 3: Index numbers

Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and Weighted index numbers – Various Weighted Aggregate Index numbers, Criterion of a good index number, Fisher's ideal index number. Cost of living index number and Wholesale price index number.

Unit – 4: Vital Statistics

Introduction, definition, and uses of vital statistics, sources of vital statistics. Measures of Mortality Rates – Crude Death Rate, Specific Death Rate, Standardised Death Rate with different populations and problems.

Unit – 5:

Life table – Columns, Construction and Uses of Life table, Proofs of life table functions. Measures of Fertility Rates – Crude Birth Rate, General Fertility Rate, Specific Fertility Rate, Total Fertility Rate. Measures of population growth – Pearls, Gross Reproduction Rate, Net Reproduction Rate and its problems.

Applied Statistics Practical Syllabus

1. Measurement of trend by method of moving averages (odd and even period)
2. Measurement of trend by method of Least squares (linear and parabola)
3. Determination of seasonal indices by method simple averages
4. Determination of seasonal indices by method of Ratio to Moving Averages
5. Determination of seasonal indices by method of Ratio to Trend
6. Determination of seasonal indices by method of Link relatives
7. Computation of simple index numbers.
8. Computation of all weighted index numbers.
9. Computation of reversal tests.
10. Computation of various Mortality rates
11. Computation of various Fertility rates
12. Computation of various Reproduction rates.
13. Construction of Life Table.

III. References

1. Fundamentals of Applied Statistics: V. K. Kapoor & S. C. Gupta.
2. Mukopadhyay, P (2011): Applied Statistics, 2nd ed. Revised reprint, Books and Allied Pvt. Ltd.
3. Brockwell, P.J. and Devis, R.A. (2003): Introduction to Time Series Analysis. Springer.
4. Chatfield, C. (2001): Time Series Forecasting., Chapman & Hall.
5. Srinivasan, K. (1998): Demographic Techniques and Applications. Sage Publications
6. Srivastava O.S. (1983): A Text Book of Demography. Vikas Publishing House.

IV. Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Course 6: Operations Research

I. Learning Outcomes

After learning this course, the student will be able

1. To know the scope of Operations Research
2. To link the OR techniques with business environment and life sciences
3. To convert real life problems into mathematical models
4. To find a solution to the problem in different cases
5. To inculcate logical thinking to find a solution to the problem

II. Syllabus**unit – 1:**

Introduction of OR – Origin and development of OR – Nature and features of OR –Scientific Method in OR – Modeling in OR – Advantages and limitations of Models-General Solution methods of OR models – Applications of Operation Research. Linear Programming problem (LPP) – Mathematical formulation of the problem - illustrations on Mathematical formulation of Linear Programming of problem.

Unit – 2:

Graphical solution of linear Programming problems with maximizing and minimizing objective function up to 3 variables. Finding convex hull and non-convex hull of LPP. Some exceptional cases - Alternative solutions, Unbounded solutions, non-existing feasible solutions by Graphical method.

Unit – 3:

General linear Programming Problem(GLP) – Definition and Matrix form of GLP problem, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP and Canonical form of LPP. Definitions of Solution, Basic Solution, Degenerate Solution, Basic feasible Solution and Optimum Basic Feasible Solution. Introduction to Simplex method and Computational procedure of simplex algorithm. Solving LPP by Simplex method (Maximization case and Minimization case up to three variables only)

Unit – 4:

Artificial variable technique - Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solution, Unbounded solution, Non existing feasible solution and Solution of simultaneous equations by Simplex method.

Unit – 5:

Duality in Linear Programming –Concept of duality -Definition of Primal and Dual Problems, General rules for converting any primal into its Dual, Relation between the solution of Primal and Dual problem (statements only). Using duality to solve primal problem. Dual Simplex Method.

Practical Syllabus

1. To solve Linear Programming Problem using Graphical Method with
 - i. Unbounded solution
 - ii. Infeasible solution
2. Solution of LPP with simplex method.
3. Problem solving using Big M - method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
 - iii. Unbounded solution
 - iv. Alternative or multiple solutions.
6. Problems based on Principle of Duality.
7. Problems based on Dual simplex method.

III. References

1. S.D. Sharma: Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohn: Operations Research, Sultan Chand and sons, NewDelhi.
3. J.K. Sharma: Operations Research and Application, Mc.Millan and Company, New Delhi.
4. Gass S.I: Linear Programming. Mc Graw Hill.
5. Hadly G: Linear Programming. Addison-Wesley.
6. Taha H.M: Operations Research: An Introduction : Mac Millan.

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