

Semester-IV

Course : BA STATISTICS
Discipline Specific Course (DSC)

The course STATISTICS in IV semester has two papers (Paper VII & VIII) for 06 credits: Each paper has 03 credits. Both the papers are compulsory. Details of the courses are as under.

Course No.7 (Paper-I): Title of the Course (Paper-I): **21BA4STSDSCT1: Title of Paper: ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS**

Year	II	Course Code: 21BA4STSDSCT1	Credits	03
Sem.	IV	Course Title: Title of Paper: ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS	Hours	42
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 40		Summative Assessment Marks: 60	Duration of ESA:.03 hrs.	

Course Outcome (CO):

After the successful completion of the course, the students will be able to:

CO 1 : Develop strategic plans for experimentation in scientific research projects.

CO 2 : Apply the principles of Design of Experiment to generate experimental designs.

CO 3 : Develop problem solving skills for the application of Design of experiments to Agriculture and controlled laboratory experiments.

Syllabus-Course 7: 21BA4STSDSCT1: Title of Paper: ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS	Total Hrs: 42
Unit-I Analysis of Variance: One-Way and Two-way Classification	18 hrs
Definition of analysis of variance and its basic assumptions. Meaning of assignable and chance variations. ANOVA for one-way classified data-definition, linear mathematical model, assumptions, statement of hypothesis, splitting up of total sum of squares into various component sum of squares, degrees of freedom and ANOVA table. Simple numerical problems one-way classified data. Analysis of variance for two-way classification – definition, linear mathematical model, assumptions, statement of hypothesis, splitting up of total sum of squares into various component sum of squares. Degrees of freedom and ANOVA table. Simple numerical problems on two way classified data.	
Unit-II Design of Experiments: Completely Randomized Design	12 hrs
Definition of terms - Experiment, treatment, experimental unit, experimental	

material, yield, block, precision, experimental error, uniformity trials, and efficiency. Basic principles of design of experiments – Replication, Randomization and Local control. Completely Randomized Design (CRD) -definition, layout, linear mathematical model, assumptions, hypothesis, splitting up of sum of squares into various component sum of squares, degrees of freedom and ANOVA table. Merits, demerits and applications of CRD. Simple numerical problems.	
Unit-III Randomized Block Design	12 hrs
Introduction and definition of Randomized Block Design (RBD), layout, linear mathematical model, assumptions, statistical hypothesis, splitting up of total sum of squares into various component sum of squares, degree of freedom, and ANOVA table. Merits and demerits of RBD. Applications of RBD. Comparison between CRD and RBD. Simple problems.	

Books recommended.

1. Das, M.N. and Giri, N.C. (1986). Design and Analysis of Experiments, II Edition Wiley Eastern Ltd., New Delhi
2. Goon, A.M., Gupta, M.K. and Dasgupta, B. (1998). Fundamentals of Statistics, Vol. II, The world Press Pvt. Ltd. Kolkatta.
3. Gupta S. P. (2021). Statistical Methods, Sultan Chand and Sons, New Delhi, 46th edition.
4. Gupta S. C. and V. K. Kapoor (2018). Fundamentals of Applied Statistics, Sultan Chand, New Delhi.
5. Mukhopadhaya, P. (2011). Applied Statistics, Books and Allied Ltd.
6. Gani S. G.(2003). Sankhyshastra and Ganakayantra. Udaya Ravi Publications, Bijapur.

Semester – IV

Course : BA STATISTICS
Discipline Specific Course (DSC)

Course No.-8 (Paper No. II): Title of the Course: 21BA4STSDSCT2 : REGRESSION ANALYSIS AND ECONOMETRICS

Year	II	Course Code: 21BA4STSDSCT2	Credits	03
Sem.	IV	Course Title: Title of Paper: REGRESSION ANALYSIS AND ECONOMETRICS	Hours	42
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 40		Summative Assessment Marks: 60	Duration of ESA:.03 hrs.	

Course Outcome (CO):

After completion of the course, students will be able to:

- CO 1 :** Provide a wider and deeper exposure to the econometric techniques and their application to the discipline of Economics.
- CO 2 :** Gain an understanding of how to solve problems using econometrics that are common to economic modeling.
- CO 3 :** Develop ability to accurately translate complex economic problems into models and so as to solve them by applying econometric techniques.

Syllabus-Course 8: 21BA4STSDSCT2: Title- REGRESSION ANALYSIS AND ECONOMETRICS	Total Hrs: 42
Unit-I: Introduction to Econometrics and Simple Regression Analysis	18 hrs
Econometrics – definitions – scope – methodology – types. Quantification of hypothetical linear relationship using appropriate data. Two variable regression model, assumptions, method of least squares properties. maximum likelihood method, testing of hypotheses using point and interval estimates, forecasting solving problems using SPSS.	
Unit-II : Multiple Regression Analysis	12 hrs
Nonlinear relationships – transformation of variables – functional forms – three variable regression model – applications using SPSS. General linear model (matrix approach) – specification – OLS estimators –The properties of the estimated regression coefficients, hypothesis testing and the construction of confidence intervals of the regression model, problems.	

Unit-III: Problems in regression analysis	12 hrs
Violation of classical assumptions – multicollinearity – autocorrelation — problems – causes – consequences – remedial measures – model specification and diagnostic testing.	

Books recommended.

1. Damodar N. Gujarathi (2009). Basic Econometrics, New Delhi: Tata McGraw Hill
2. Companies Johnston, J. (1972). Econometric Methods, 2nd Edition, McGraw Hill International.
3. Koutsoyiannis, A. (2004). Theory of Econometrics, 2nd Edition, , Palgrave Macmillan Limited
4. Maddala, G.S. and Lahiri, K. (2009). Introduction to Econometrics, 4th Edition, John Wiley & Sons
5. G.M.K. Madanani (1980). Introduction to Econometrics, second edition, Oxford & IBH Publishing company, New Delhi.
6. Gupta, S.C. and Kapoor, V. K. (2020). Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.

Semester – IV

Course : BA STATISTICS

OEC-4: Title of the Course: 21BA4STSOECT1: Quantitative Analysis Techniques

Year	II	Course Code: 21BA4STSOECT1	Credits	03
Sem.	IV	Course Title: Title of Paper: Quantitative Analysis Techniques	Hours	42
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 40		Summative Assessment Marks: 60	Duration of ESA:.03 hrs.	

Course Outcome (CO):

After the completion of this course, students will be able to:

CO 1 : Carryout correlation and regression analysis

CO 2 : Formulate and solve linear programming problems

CO 3 : Formulate and solve transportation and assignment problems

Syllabus-Course OEC-4 : 21BA4STSOECT1: Title- Quantitative Analysis Techniques	Total Hrs: 42
Unit-I Correlation and regression analysis	18 hrs
Correlation- Definition, Types - Simple, multiple, partial. Causation - Spurious, positive, negative, perfect and no correlation, explanation with examples. Importance of	

<p>correlation analysis. Measurement of correlation- scatter diagram, Karl Pearson's coefficient of correlation, Properties of coefficient of correlation, interpretation. Spearman's coefficient of rank correlation – with and without ties, interpretation. Coefficient of determination and its interpretation.</p> <p>Regression-Definition, regression lines/equations of X on Y and Y on X. Properties of regression coefficients and regression lines/equations. Principle of least squares and fitting of linear, quadratic and exponential curves. Uses of regression analysis. Comparison between correlation and regression.</p>	
Unit-II Linear programming problem (LPP)	12 hrs
<p>Definition and scope of Operations Research (OR). Modeling and solution. Linear Programming Problem (L.P.P): Definition, Standard forms. Formulation of LPP. Basic Solutions, degenerate and non-degenerate solutions. Graphical method of solving LPP. Criteria for unbounded, Multiple and infeasible solutions.</p>	
Unit-III Transportation problem and Assignment Problem	12 hrs
<p>Transportation problem: Mathematical formulation. Existence of feasible solution. Finding initial basic feasible solution: North West Corner Rule, matrix minima method and Vogel's method. Unbalanced transportation problem.</p> <p>Assignment Problem: Mathematical Formulation and Hungarian algorithm. Unbalanced assignment problem.</p>	

Books recommended.

References

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002). Fundamentals of Statistics, Vol. I, 8th Ed., The World Press, Kolkata.
2. Ross, S.M. (2014). Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Academic Press.
3. KanthiSwaroop, Manmohan and P. K. Gupta (2013). Operation Research, Sultan Chand New Delhi.
4. Mustafi, C.K.(2006). Operations Research Methods and Practice, 3/e.NewAge Publication.
5. Narag. A.S.(1970). Linear Programming and Decision Making. Sultan Chand and Co.
6. Sharma, J K.(2013). Operations Research: Theory and Applications (5/e). New Delhi: Laxmi Publications.