ST.JOSEPH'S COLLEGE FOR WO(AUTONOMOUS),VISAKHAPATNAMVII SEMESTERSTATISTICSTIME: 4 Hrs/WeekST 7202(3)MULTIVARIATE ANALYSISMax. Marks:100SYLLABUSSYLLABUSSYLLABUS

Course Objectives:

CO1: To acquaint the students the multivariate normal (MVN) distribution properties and estimation of the parameters of MVN populations.

CO2: To acquaint the students with the applications of Hotelling T2 Statistic and Mahalanobis D2 statistic in case of one sample, two samples and paired samples drawn from MVN populations.

CO3: To explore the students with application of principal component analysis (PCA), discriminant analysis, cluster analysis, factor analysis.

Learning Outcomes:

After successful completion of the course the student will be able

LO1: To apply Hotelling T2 Statistic and Mahalanobis D2 statistic for testing the equality of two MVN population mean vectors in two samples and paired samples drawn from MVN populations.

LO2: To carry out one-way (MANOVA) for one way classification multivariate data.

LO3: To explore the students with application of principal component analysis (PCA), discriminant analysis, cluster analysis, factor analysis and interpret results from multi dimensional scalling.

LO4: Understand the various hierarchical and non-hierarchical clustering methods and their applications.

LO5: Use of popular statistical packages in analyzing the real data sets.

SCOURSE:

Unit I

Multivariate Analysis: Introduction - Application of Multivariate techniques – Organisation of Multivariate data –Derivation of Bi-variate and multivariate normal distributions and its properties - Determination of mean vector and covariance matrix of Multivariate Normal Distribution - The mean vector and covariance matrix for Linear combinations of Random Variables – The maximum likelihood estimators of the mean vector and covariance matrix of Multivariate Normal Distribution.

Unit II

Wishart Distribution: Introduction - Characteristic function and properties of Wishart Distribution. Generalized T-Square Statistic: Introduction – Derivation of the Generalized T-Square Statistic (Hotelling T Square) distribution – uses – applications. Hotelling T Square and Likelihood Ratio Tests.

Unit III

Multiple Linear Regression: Introduction –Classical Linear Regression Model – Least Square Estimators - Inferences about the Regression Model – Inferences from the Estimated Regression Function – Model Checking and Other Aspects of Regression – Multivariate Multiple Regression.

Unit IV

Principal Components: Objectives – Population Principal Components – Extraction of Principal Components. Factor Analysis: Introduction – Model Description (The Orthogonal Factor Model) – Methods of estimation – Factor rotation - Factor Scores – Perspectives and a strategy for Factor Analysis.

Unit V

Discriminant Analysis: Objectives and assumptions - Fisher's Discriminant Function - Problem of Classification with Two or More Populations. Cluster Analysis: Objectives – Assumptions - Research design – Formation of clusters – Clustering algorithm.

Books Recommended

1. Anderson T.W, (2011): An Introduction to Multivariate Statistical Analysis: Wiley India Pvt. Ltd, New Delhi (Third Edition)

2. Kshirsagar, A. M. (1983): Multivariate Analysis, Marcel Dekker

3. Morrison, D.F. (1990): Multivariate Statistical Methods, McGraw Hill Co.

- 4. Rao, C. R. (1995): Linear Statistical Inference and its Applications, WileyEastern
- 5. Timm, N. H. (2002): Applied Multivariate Analysis, Springer, New York
- 6. Giri, N.C.(1977): Multivariate statistical inference, Academic Press