

Semester	TWO
Paper Number	6
Paper Code	MDTS 4212
Paper Title	Multivariate Analysis
No. of Credits	6
Course description	<p>CORE Composite Paper Module 1: Unit 1 (2 classes/week) Module 2: Unit 2 (2classes/week) No. of classes assigned Theory: 4 classes per week Practical: 3 classes per week</p>
Course objective	<p>At the end of the course, the students should be able to understand</p> <ul style="list-style-type: none"> • Multivariate Probability Distributions. • Sampling distributions of some statistics drawn from Multivariate Normal distribution. • Basic concepts and applications of Copula. • Multivariate Data Visualisation. • Application of multivariate techniques.
Syllabus	<p>Module-I: Multivariate Probability Distributions</p> <p>Multivariate Data Visualisation: Mosaic Plots, Scatterplot Matrix, Bivariate qq-plots, Spider Web plots, DD Plots, Parallel coordinate plots, Trellis Displays. [6]</p> <p>Multivariate Probability Distributions: Random Vector, Mean vector & Dispersion matrix, Probability mass/density functions, Marginal & Conditional distributions, Multiple and partial correlation coefficient, Multinomial Distribution, Dirichlet Distribution, Multivariate Normal distribution and its properties. [12]</p> <p>Sampling from Multivariate Normal Distribution: Sampling distribution for mean vector and variance-covariance matrix, Wishart Distribution, Hotelling T^2 and Mahalanobis D^2. [4]</p> <p>Copula: Definition and basic properties, Multivariate Distribution using Copula Functions. [4]</p>

	<p>Module-2: Multivariate Techniques</p> <p>Decomposition of data matrices by factors, Principal Component Analysis, Independent Component Analysis, Factor Analysis, Correspondence Analysis, Canonical Correlation Analysis, Discriminant Analysis, Cluster Analysis, Multidimensional Scaling. [26]</p>	
Practical	Based on theory topics	
Reading/Reference Lists	<ol style="list-style-type: none"> 1. Johnson/Wichern; Applied Multivariate Statistical Analysis Sixth Edition, Pearson 2015 2. Hardle Wolfgang, Simar Leopold: Applied Multivariate Statistical Analysis, Second Edition, Springer. 3. Roger B. Nelsen: An introduction to Copulas, Second Edition, Springer. 	
Evaluation	<p>Theory</p> <p>CIA: 10</p> <p>End Sem Exam: 50 (25+25)</p> <p>Total : 60</p>	<p>Practical</p> <p>Continuous Assessment: 30</p> <p>End Sem Viva: 10</p> <p>Total: 40</p>
Paper Structure for End Semester Theory	Short questions: 5 marks each	Long questions: 10 marks each
Module I	1 out of 2	2 out of 3
Module II	1 out of 2	2 out of 3