Semester	**ONE**
Paper Number	**1**
Paper Code	**MDTS 4111**
Paper Title	**Introduction to Data Science and Data Structures**
No. of Credits	**6**
Course description	CORE Composite Paper Module 1: 2 classes/week. Using Excel, R, Tableau. Module 2**:** 2classes/week. Using Python No. of classes assigned Theory: 4 classes per week Practical: 4 classes per week
Course Objective	At the end of the course, the students should be able to 1. Compute basic descriptive measures 2. Perform exploratory data analysis with descriptive statistics on given data sets. 3. Gain experience in creating a data visualisation for an application domain of their choice. 4. Critically evaluate and interpret a data visualisation. 5. Analyze, evaluate, and implement data structures & algorithms using python.
Syllabus	**Module1: Introduction to Data Science** **Unit 1:** Motivation for data Science: Story telling with data with illustration from different fields. Data abstraction and data wrangling. Storage of data. [4] Data: Types of data, scales of measurement. [3] Univariate Data: Descriptive measures related to univariate metric data. [4] Bivariate Data: Descriptive measures related to bivariate metric data: Correlations, linear and polynomial regressions. Descriptive measures related to bivariate categorical data: Measures of associations in a contingency table. [7]

	Unit 2: Exploratory data analysis: Philosophy of EDA, Basic tools of EDA (plots, graphs and summary statistics). [4] Data Visualization: Basic principles, ideas and tools for data visualization. Visualization of qualitative, quantitative, temporal, spatial and panel data. [4] **Module2: Data Structures** Introduction to Data Structures, Arrays, Linked Lists, Stacks, Queues, Binary Trees, Threaded Binary Trees,Binary Search Trees, AVL trees, Sets, Tuples, Dictionaries, Trie Searching and Sorting algorithms Basic ideas on complexity analysis, Big-Oh, Big-Omega, Big-Theta notations. [26]
Practical	Module1: Based on the Theory Topics Module2: Practical based on Data Structures using Python.
Reading/Reference Lists	1. Jeffrey M. Stanton (2013). Introduction to Data Science. 2. The Visual Display of Quantitative Information (2nd Edition). E. Tufte. Graphics 3. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, SecondEdition. ISBN 0387952845. 2009. (free online) 4. Yule G.U. and Kendall M.G (1994) : An Introduction to the theory of Statistics. 14th Edn. UniversalBook stall, Delhi. 5. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed,Pearson Education, New Delhi. 6. Data Structures and Algorithms in Python, Michael T Goodrich, Roberto Tamassia, Michael H Goldwasser, John Wiley 7. A First Course on Data Structures in Python, Donald R. Sheehy.

Evaluation	Theory CIA: 10 End Sem Exam: 25+25 Total : 60	Practical Continuous Assessment: 30 End Sem Viva: 10 Total: 40
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