ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2024-25

COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

SEMESTER IV

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	PCC	24DS401T	Analysis of Algorithms	3	-	-	3	20	20	60	100	3
2.	PCC	24DS401P	Analysis of Algorithms Lab	-	-	2	1	-	25	25	50	-
3.	PCC	24DS402T	Object Oriented Programming	3	-	-	3	20	20	60	100	3
4.	PCC	24DS402P	Object Oriented Programming Lab	-	-	2	1	-	25	25	50	-
5.	PCC	24DS403P	Data Handling & Visualization Lab	-	-	2	1	-	25	25	50	-
6.	PCC	24DS404P	Data Science Workshop – IV Data Analytics	-	-	2	1	-	25	25	50	-
7.	VSC	24DS406P	Technical Skill Development - I	-	-	4	2	-	50	-	50	-
8.	AEC	24DS407T	Economics and Management	3	-	-	3	20	20	60	100	3
9.	SEC	24DS441P	Career Development - IV	-	-	2	1	-	50	-	50	-
10.	ELC	24DS405P	Micro Project II*	-	-	2	1	-	50	-	50	-
11.	MDM	24DS431M	Multidisciplinary Minor -II	3	-	-	3	20	20	60	100	3
			Total	12	-	16	20	80	330	340	750	-

*** Field Project or Community engagement project in the major discipline**

MDM-II	Data Analytics with R

Chairman - BoS	Dean – Academics	July 2025	NEP 2.1	Applicable for 2025-26
		Date of Release	Version	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS401T	Analysis of Algorithms	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended to provide - 1. Ability to understand analysis of asymptotic performance of algorithms. 2. Ability to understand analysis of asymptotic runtime complexity of algorithms including formulating recurrence relations. 3. Understanding and way of designing algorithms using greedy strategy, divide and conquer approach, dynamic programming.	**The students will be able to -** 1. Apply various methods to solve recurrence relation and analyze worst-case running times of algorithms using asymptotic notation. 2. Implement greedy, divide & conquer algorithms and solve recurrences describing the performance of each. 3. Interpret dynamic-programming paradigm, analyze and implement dynamic programming algorithms. 4. Describe the major graph algorithms and employ graphs to model engineering problems. 5. Develop the concepts of tractable and intractable problems and the classes P, NP-Hard, and NP-Complete.

Unit I	**[10Hrs]**
Mathematical foundation, Asymptotic notations, Recurrence Relations, Analysis of algorithms: Best, worst and average case. Searching: binary search trees, balanced binary search trees, AVL trees and and red-black trees. Sorting algorithms: bubble sort, insertion sort, Divide-and-conquer: binary search, quick-sort, merge sort.	
Unit II	**[10Hrs]**
Greedy method – basic strategy, 0/1 knapsack problem, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path, closest-pair and convex – hull problems etc.	
Unit III	**[9Hrs]**
Dynamic Programming- basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, travelling salesman problem, longest common sub sequence problem.	
Unit IV	**[8Hrs]**
Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking- basic strategy, 8-Queen's problem, graph coloring, Hamiltonian Circuit Problem, Subset Sum Problem , randomized and approximation algorithms.	
Unit V	**[8Hrs]**
Sorting in linear time - radix sort and counting sort, etc. NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms. Topics in advanced algorithmic techniques.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Introduction to Algorithms	Cormen T.H		Prentice Hall of India

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Computer Algorithms	Horowitz, Sahani, Rajsekharan		Galgotia Publications Pvt. Ltd
2.	Foundations of Algorithms	Shailesh R Sathe		Penram publication

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS401P	Analysis of Algorithms Lab	-		2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended to provide 1. Ability to understand analysis of asymptotic performance of algorithms. 2. Ability to understand analysis of asymptotic runtime complexity of algorithms including formulating recurrence relations. 3. Understanding and way of designing algorithms using greedy strategy, divide and conquer approach, dynamic programming.	Student will be able to: 1. Implement greedy, divide & conquer algorithms and solve recurrences describing the performance of each. 2. Evaluate dynamic-programming paradigm, analyze and implement dynamic programming algorithms. 3. Construct the major graph algorithms and employ graphs to model engineering problems.

Expt. No.	Title of the experiment
1	Implementation and Time Analysis of factorial program using iterative and recursive method.
2	Implementation and Time Analysis of linear and binary search algorithms.
3	Implementation and Time Analysis of sorting algorithms - Merge Sort and Quick Sort.
4	Implementation of a knapsack problem using greedy method.
5	Implementation of minimum cost spanning tree and its analysis.
6	Implementation of Single source shortest path problem for a given graph.
7	Implementation of radix sort and counting sort and its time analysis.
8	Develop a program module based on real-life application by making a selective choice of algorithms.

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Introduction to Algorithms	Cormen T.H		Prentice Hall of India

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Computer Algorithms	Horowitz, Sahani, Rajsekharan		Galgotia Publications Pvt. Ltd
2.	Foundations of Algorithms	Shailesh R Sathe		Penram publication

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS402T	Object Oriented Programming	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended 1. To provide understanding of Object Oriented Programming concepts 2. To enable students to think in terms of object oriented paradigm and apply concepts to develop programs 3. To develop an application using error handling techniques and I/O streams	**Students will be able to** 1. Analyze and think in terms of object oriented paradigm during development of application 2. Apply the concept object initialization and destroy using constructors and destructors. 3. Develop application using the concept of inheritance and evaluate the usefulness. 4. classify & demonstrate the use of different data structures linked list, trees & graphs along with related algorithms. 5. create applications with the usage of different data structures using object oriented programming concept

Unit I	**[10Hrs]**
Introduction to object oriented programming paradigm, Procedure oriented programming vs OOP, Features of OOP, Benefits of OOP, Concept of a class, Access control of members of a class, Instantiating a class,	
Unit II	**[8Hrs]**
Functions in OOP: Friend functions, Passing & returning Objects, Pointers to members, Constructors and destructors, Polymorphism : Function overloading, Operator overloading. Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception.	
Unit III	**[10Hrs]**
Inheritance: Base and Derived classes, Different forms of inheritance, Access specifiers Base and Derived class constructors & Destructors, Virtual base class. Abstract classes.Virtual functions,	
Unit IV	**[8Hrs]**
Data Structures : Singly linked list, Operations on linked list, Polynomial representations and manipulations are using linked list, circular linked list, doubly linked list,Sparse matrix,	
Unit V	**[9Hrs]**
Trees: Basic trees, Binary tree representations, Threaded storage representation, Binary tree traversals, Binary search trees, Application of trees. Preliminary treatment of AVL Trees, B- Trees. **Graphs**: Definition & terminology, Graph representation: matrix representation of Graph, Breadth First Search, Depth First Search, **The concepts should be practiced using C++**	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Object Oriented Programming with C++	E.Balaguruswamy	6th	TMH
2	The Complete Reference C++	Herbert Schildt	4th	Tata McGraw Hill
3	Fundamentals of Data Structure	Horowitz and Sahani		CBS Publications

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Let us C++	Yashavant Kanetkar		BPB Publications
2.	Schaum's outline: Date Structures	Seymour Lipschutz		Tata Mc Graw Hill

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS402P	Object Oriented Programming Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
. The objective of this course is to provide students with a strong foundation in Object-Oriented Programming (OOP), enabling them to design and implement software solutions using core OOP principles Students will gain proficiency in programming languages like C++ or Java, develop problem-solving skills relevant to engineering applications, and learn to create modular, reusable, and maintainable code.	The student will able to **1.** Realize the difference between the top-down and bottom-up approach along with thinking in terms of objects. **2.** Implement Different features of OOP **3.** Implement operations like on data structures using object oriented paradigm

Expt. No.	Title of the experiment
1	To explore the fundamentals of object-oriented programming by creating and utilizing classes and objects.
2	To demonstrate the use of constructors and destructors
3	To examine how inheritance enables the reuse of attributes and methods from base to derived classes.
4	To apply compile-time and run-time polymorphism
5	To investigate the purpose of abstract classes and pure virtual functions in enabling polymorphism.
6	To construct and manipulate a linked list to understand dynamic, node-based data organization.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Object Oriented Programming with C++	E.Balaguruswamy	6th	TMH
2	The Complete Reference C++	Herbert Schildt	4th	Tata McGraw Hill
3	Fundamentals of Data Structure	Horowitz and Sahani		CBS Publications

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Let us C++	Yashavant Kanetkar		BPB Publications
2.	Schaum's outline: Date Structures	Seymour Lipschutz		Tata Mc Graw Hill

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS403P	Data Handling and Visualization Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended **1.** To make data visualization easier to identify patterns, trends and outliers in large data sets. **2.** To solve data inefficiencies and absorb vast amounts of data presented in visual formats	**Students will be able to** **1.** Learn and observe working of different handling and visualization tools **2.** Find and select appropriate data that can be used in order to create a visualization **3.** Properly document and organize data and visualizations in order to prepare them for reuse. **4.** Visualize data and statistics in different from like data **5.** Identify and apply appropriate data visualization technique(s)

Expt . No.	Title of the experiment
1	Study and Demonstrate the Infogram data visualization tool With real data set
2	Study and Demonstrate python based Data Cleaning with Pandas and Numpy.
3	Study and demonstrate automated data cleaning process by Data cleaner tool
4	Demonstrate Metadata Editing, Joining and sorting using Power BI
5	Study and Demonstrate Crosstab Chart for Sales Analysis using Tableau
6	Study and Demonstrate Time series Data Visualization
7	Study and Demonstrate process to extract content and Data from the Website using the Web Scraper tool.
8	Demonstrate Data Wrangling and Interactive Dashboard Creation.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Information Dashboard Design: Displaying Data for At-a- glance monitoring	Stephen Few		
2	Getting Started with Tableau 2019.2	Tristan Guillevin.	2nd Edition	
3	Apache Spark in 24 Hours, Yourself	Jeffrey Aven		Sams Teach
4	Fundamentals of Data Visualization – A Primer on Making Informative and compelling Figures	Claus O. Wilke		O'Reilly

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS404P	Data Science Workshop-IV Data Analytics	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended to 1. Use modern data processing tools to perform cleaning, transformation, and exploratory data analysis.. 2. Apply machine learning and statistical methods for building and evaluating predictive and analytical models.	**Students will be able to** 1. Explain data pre-processing concepts and perform data profiling and cleansing using modern Python. 2. Apply EDA techniques, statistical analysis, and machine learning libraries to extract insights and build models. 3. Develop and deploy data-driven solutions such as predictive models pipelines using Flask . 4. Analyse time series trends and performance bottlenecks in large-scale datasets using high-performance frameworks.

Students will apply modern tools such as Pandas, Pyjanitor, Weka, and Y-Data Profiling to perform data cleaning, preprocessing, exploratory analysis, classification, association rule mining, time series forecasting and clustering on real-world datasets.

Expt. No.	Title of the experiment
1	Perform data wrangling and cleaning using Pandas and Pyjanitor.
2	Prepare clean and structured customer leads for a digital marketing campaign.
3	Use Weka data analytical tool for preprocessing of titanic dataset
4	Use Weka data analytical tool to build and evaluate a Decision Tree classifier on the Titanic dataset.
5	Conduct interactive exploratory data analysis using Y Data Profiling
6	Use Weka to perform Market Basket Analysis on a retail transaction dataset using association rule mining.
7	Build and interpret an ARIMA model on a real-world time series dataset; perform forecasting, analyze model diagnostics, and interpret results.
8	Clustering in predictive algorithm

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Python Data Science Handbook: Essential Tools for Working with Data	Wes McKinney	Second Edition (2023)	O'Reilly Media
2.	Data Engineering with Python	Paul Crickard	First Edition (2020)	Packt Publishing

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Data Science and Data Analytics Using Python	Munesh Chandra Trivedi and Anil Kumar Dubey	First Edition (2025)	Khanna Publishing House

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS431M	MDM – II Data Analytics with R	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended to • Learn R. Programming language, data analytics, data visualization and statistical model for data analytics.	**Students will be able to** **1.** Analyze the basic concepts of Data Analytics. **2.** Implement the basic concepts of R programming for data analysis & Demonstrate how to install and configure RStudio. **3.** Apply various data structures in the R programming language for organizing the data. **4.** Implement statistical methods and models such as regression analysis, decision trees using R to analyze data effectively. **5.** Develop strategies for creating actionable data through experiments

Unit I	**[9Hrs]**
Introduction to Data Analysis: Introduction to Data, Information, Types of data, sources of data. Trends in data science Overview of Data Analytics, Need of Data Analytics, Nature of Data**,** Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.	
Unit II	**[9Hrs]**
R Programming Basics Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.	
Unit III	**[9Hrs]**
Data Visualization using R Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms,Boxplots,Bar Charts, Line Graphs, Scatterplots, Pie Charts	
Unit IV	**[9Hrs]**
Statistics with R Random Forest, Decision Tree, Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression, Logistic Regression, Survival Analysis	
Unit V	**[9Hrs]**
Prescriptive Analytics Creating data for analytics through designed experiments, Creating data for analytics through active learning, Creating data for analytics through Reinforcement learning.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	An Introduction to R	W. N. Venables	3	

Reference Books

S. N	Title	Authors	Edition	Publisher
3.	R Programming for Beginners	Sandhya Arora, Latesh Malik	1	Universities Press.
4.	Easy R Programming for Beginners,	Felix Alvaro		Create Space
5.	Introduction to Statistics and Data Analysis	Christian Heumann		Springer.

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS406P	Technical Skill Development – I	-	-	4	2	50	-	50

Course Objectives	Course Outcomes
This course is intended to 1. Enable students to execute SQL queries ranging from basic operations to advanced multi-table and subquery-based queries. 2. Train students in PL/SQL programming to create functions, procedures, triggers, and cursor-based data processing. 3. Develop skills in managing database transactions safely using ACID, concurrency control, and recovery mechanisms	Students will be able to 1. Design and implement relational database schemas for real-world applications. 2. Write and optimize complex SQL queries using joins, aggregations, and subqueries. 3. Apply PL/SQL constructs such as functions, triggers, procedures, and cursors to automate database operations. 4. Implement safe and consistent database transactions with concurrency control techniques. 5. Use NoSQL databases (MongoDB/Redis) for handling semi-structured and high-volume data.

Expt. No.	Title of the experiment
1	SQL DDL Commands: CREATE, ALTER, DROP tables. Define constraints (PK, FK, UNIQUE, CHECK). SQL DML Commands. Insert multiple rows. Update and delete operations. Basic SQL Queries:SELECT queries with WHERE, LIKE, BETWEEN, ORDER BY.
2	JOIN Operations : INNER, LEFT, RIGHT, FULL JOIN. Practical case: Customer–Order, Student–Course.
3	Aggregate Functions & GROUP BY Queries : COUNT, MAX, MIN, AVG, SUM. GROUP BY & HAVING clauses.
4	Sub queries & Nested Queries : Single-row, multi-row, correlated sub queries.
5	VIEW and INDEX Creation : Create simple & complex views. Create B-tree & multicolumn indexes. Use EXPLAIN to check performance.
6	PL/SQL – Anonymous Block : Variables, loops, conditions. Basic arithmetic & processing. Transaction Management & Concurrency Control COMMIT, ROLLBACK, SAVEPOINT. Locking demonstration (row-level locks, deadlock simulation).
7	PL/SQL – Triggers : BEFORE ,AFTER, INSERT, UPDATE , DELETE triggers. Audit log trigger implementation.PL/SQL – Cursors & Exception Handling. Explicit cursors (OPEN–FETCH–CLOSE). Predefined & user-defined exceptions.
8	Deploy DB on AWS RDS / Azure SQL / Cloud SQL, AWS DynamoDB.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Database Management Systems	Raghu Ramakrishnan		McGraw-Hill
2	Fundamentals of Database Systems	Elmasri & Navathe		Pearson

Reference Books

S. N	Title	Authors	Edition	Publisher
1	SQL, PL/SQL: The Programming Language of Oracle	Ivan Bayross		PHI

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS406T	Economics and Management	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended • To examines how the economics, business and industrial management practices are related and how business decision is taken.	**Students will be able to** 1. Apply managerial economics concept in business analysis and business decision making. 2. Explain relationships between production and costs and understand different forms of market structures. 3. Assess impact of macroeconomics and government policies on business and economy. 4. Recognize the functions of management and marketing management for business decisions. 5. Explore role of financial management in business and decision making.

Unit I	**[9Hrs]**
Economics, Classification of economics, Industrial economics, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Utility, Law of diminishing marginal Utility, Types of Elasticity of demand	
Unit II	**[9Hrs]**
Concept of Production, Factors of Production, Laws of return, Cost concepts and types of cost, cost curves, Market Structures Perfect competition, Monopoly, Oligopoly, and Monopolistic competition.	
Unit III	**[9Hrs]**
The functions of central bank, Inflation, Deflation, Recession. Measures to control Inflation, National income, GDP, GNP. Liberalization, Privatization and Globalization	
Unit IV	**[9Hrs]**
Definition of management, functions of management – planning, organizing, directing, Controlling, Introduction to human resources Management, Marketing Management, Concepts of Marketing, Marketing mix, Methods of pricing, channels of distribution, advertising and sales promotion.	
Unit V	**[9Hrs]**
Financial Management, nature and scope of financial management, Sources of finance, Types of capital, Brief outline of profit and loss account, balance sheet, Budgets and types of budgets, Ratio analysis.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Managerial Economics	D.N. Dwivedi	8th	Vikas Publishing
2	Modern Economic Theory	K.K. Dewett	2005	S. Chand Publisher
3	Industrial Management	Dr.I.K. Chopde, Dr.A.M. Sheikh	Revised Edition	S. Chand Publisher

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Industrial Organization and Industrial economics	T.R. Banga, S.C. Sharma	2006	Khanna Publishers

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS441P	Career Development – IV	-	-	2	01	50	-	50

Course Objectives	Course Outcomes
1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors. **2.** This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. **3.** To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.	**1.** Students shall understand the concepts of Quadratic Equation, AP, GP, and HP. **2**. Students shall understand the concepts of Averages and Mixture and allegations **3**. Students shall understand the concepts of Blood relation. **4**. Students shall understand the concept of Dice and Cubes **5**. Students shall understand the concepts of clocks and Calendars.

Unit I	**[6Hrs]**
Aptitude : Quadratic Equation Arithmetic progression, Geometric progression, Harmonic progression Imax: Critical Thinking, Interview Simulation, Engineering Leadership, Spatial Reasoning	
Unit II	**[6Hrs]**
Aptitude : Average Mixture and Allegation Imax: Interactive Interview Training, Start-Up & Entrepreneurship,	
Unit III	**[6Hrs]**
Aptitude : Blood Relation :- Family Tree, Coding Blood Relation, Pointing to a Person Problem Imax: Engineering Ethics, Employability, Engineering Judgment	
Unit IV	**[6Hrs]**
Aptitude : Cubes and Dice Problems:- Number of cuts to be made, Number of colorful Faces of Cubes, Hidden Dice Number Imax: Disposition for Innovation, Disposition for Start up	
Unit V	**[6Hrs]**
Aptitude : Clocks :- Angle made by Hour hand, Minutes hand, Mirror and water Image of Clock, Behind and Ahead time concept Calendars :- Day on Specific date, Coded Calendars Problems, Calendars repetition Imax: Creating A Winning Resume, Patriotism Self - respect & Start - up	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		

		July2025	NEP 2.1	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS405P	Micro Project - II *	-	-	2	1	--	50	--	50

Course Objectives	Course Outcomes
The Micro Project II course is designed to sensitize students to societal and community-oriented problems and enable them to apply data science concepts for social good. The course aims to provide hands-on experience in identifying real-world community issues, collecting and analyzing data, and proposing data-driven insights or solutions using basic data science tools and methodologies. This course emphasizes experiential learning, ethical data handling, teamwork, and reflective learning aligned with NEP 2.0.	1 Identify and clearly define a community or societal problem that can be addressed using data-driven approaches. 2 Apply fundamental data science techniques such as data preprocessing, basic statistical analysis, and simple visualization to extract meaningful insights. 3 Design and implement a basic data-driven model, dashboard, or analytical report that addresses the identified community problem. 4 Work effectively as an individual or in a team to plan, execute, document, and present the micro project outcomes. 5 Evaluate the impact, usefulness, and limitations of the proposed solution and reflect on learning gained through community engagement.

	[2Hrs]
Students shall undertake a Micro Project based on Community Engagement, preferably in collaboration with local communities, NGOs, schools, healthcare centers, municipal bodies, or campus-related stakeholders. The project should focus on applying data science concepts to solve or analyze a real-life problem of societal relevance.	