MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act,1956

COURSE CONTENT

DATA VISUALIZATION LAB							

II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
25MB023	**CORE**	1	0	2	2	40	60	100

Contact Classes:15	**Tutorial Classes:** Nil	**Practical Classes:**30	**Total Classes:** 45

Prerequisite: Basic Statistics and computer skills

COURSE OVERVIEW:

This laboratory course provides practical training in transforming raw data into meaningful visual insights for business decision-making. Students learn data cleaning, preprocessing, and exploratory analysis of structured and unstructured datasets. The course emphasizes effective visual encoding, chart selection, and dashboard design using tools like Excel, Power BI, Tableau, and Python. Design principles inspired by experts such as Edward Tufte guide clarity and ethical communication. Learners create interactive dashboards and apply storytelling frameworks to present insights. By the end of the course, students can communicate data-driven findings clearly, accurately, and responsibly.

COURSE OBJECTIVES:

- Understand the principles and best practices of data visualization and visual encoding.
- Apply data pre-processing and exploratory data analysis techniques to structured and unstructured datasets.
- Use visualization tools (e.g., Power BI, Tableau, Excel, Python) to create meaningful visual representations of business data.
- Develop dashboards and visual stories that support data-driven decision-making in business contexts.
- Evaluate visualizations for accuracy, clarity, and ethical communication aligned with transparency and sustainable reporting standards.

COURSE OUTCOMES: After completion of the course, students should be able to

1. Demonstrate basic proficiency in data import, cleaning, and visualization tools.
2. Generate appropriate charts and plots for univariate, bivariate, and multivariate data.
3. Construct interactive dashboards and visual reports for business decision-making.
4. Apply ethical visualization techniques by avoiding misleading representations of data.
5. Interpret and communicate data insights through storytelling using business or SDG datasets.

Unit –I: Introduction to data and visualization

Data, information and knowledge – measurement scales – variable selection – type conversion
statistical model – algorithmic model – history of visualization – gestalt's principles – seven stages of data visualization – data science process – types of charts – chart selection guide

Unit –II: Understanding visualization and the interface
Best visualization practices – effectiveness of visual encodings – color design principles – Edward Tufte's design principles – data – ink ratio – minimizing chart junk – minimizing lie factor – connecting to data sources – tables – charts – dashboards – stories

Unit-III: Deployment of Structured data
Visualization of structured data – data dictionary – exploring the data – univariate, bivariate and multivariate analysis and relevant charts – heat maps – dual axis charts – modelling and feature selection

Unit-IV: Deployment of Unstructured data
Visualization of unstructured data – text data visualization – forms of text data – word cloud – word tree – joint plot – subjectivity and objectivity – visualizing networks – visual storytelling

Unit –V: Dashboards and storytelling
Storytelling frameworks – data storytelling – narrative storytelling – analytical dashboard – misleading charts and graphs – cherry picking data – correlation and causation – Simpson's paradox – scaling – drill down bias – data discrepancy

Note: Laboratory work can be done using Spreadsheets /Power BI/ Tableau

TEXT BOOKS:

1. Jonathan Schwabish, *Data Visualization in Excel*, Routledge.
2. Sharada Sringeswara, Purvi Tiwari, U. Dinesh Kumar, *Data Visualization*, Wiley, 2022.
3. Mathew O. Ward, Georges Grinstein, Daniel Keim, *Interactive Data Visualization*, Routledge, 2015.
4. Seema Acharya, *Mastering Data Visualization using Tableau*, Wiley, 2024.

REFERENCE BOOKS:

1. Jonathan Schwabish, Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks, Routledge.
2. Alberto Cairo, The Functional Art: An Introduction to Information Graphics and Visualization, New Riders.
3. Kieran Healy, Data Visualization: A Practical Introduction, Princeton University Press.
4. Nathan Yau, Data Points: Visualization That Means Something, Wiley.

ELECTRONIC RESOURCES:

1. https://www.tableau.com/learn
2. https://learn.microsoft.com/power-bi
3. https://matplotlib.org/stable/api
4. https://seaborn.pydata.org/tutorial
5. https://plotly.com/python

MATERIALS ONLINE:

1. Open-ended experiments
2. Lab Manuals