Code: BCA-4006T (for theory) and BCA-4006P (for practical)	DSEC-V	Group-B: Elective-II Data Visualization	1L+T:4P	3 Credits (15 hours theory and 60 hours practical)

Max Marks; Theory: 100 (Int: 25; Ext: 75); Practical: 100

Course Outcomes: Upon completion of the course, the student will be able to
CO1: Understand the fundamentals of data visualization and its importance.
CO2: Understand visual perception and its impact on data interpretation.
CO3: Explore the ethical considerations and challenges in data visualization.
CO4: Study different types of visualizations and their appropriate uses.
CO5: Utilize Power BI to create and customize various types of visualizations.

Unit	Topics	Proposed Lectures
I	**Introduction to Data Visualization** Definition and importance of data visualization-Role of data visualization in decision making- Types of data (numerical, categorical, temporal, geographical)- Data visualization process (data collection, exploration, analysis, visualization, interpretation)- Challenges and limitations of data visualization	5
II	**Visualization tools & Data Story telling** Overview of Visualization Tools (e.g., Excel, Tableau, PowerBI, Python)- Comparing and contrasting features and Use Cases among these tools. Principles of Data Story telling: Narrative and Context-Best Practices for Dashboard Layout and Interactivity	5
III	**Designing Effective Visualizations** Principles of Good Visualization Design - Understanding and Using Color in Visualizations – Importance of Data Modeling in Visualization	5
Lab Programs	**Introduction to PowerBI Interface and Basics** 1. Installation and interface overview 2. Exploring the Power BI workspace: Ribbon, panes, and canvas. 3. Importing data from Excel and CSV files. 4. Introduction to multiple data sources 5. Basic report creation: Adding visuals and saving a report. **Data Transformation and Preparation** 1. Using Power Query Editor 2. Cleaning data: Removing duplicates, handling missing values. 3. Transforming data: Splitting columns, changing data types, renaming columns. 4. Merging and appending queries. 5. Creating custom columns and calculated columns **Data Modeling** 1. Creating relationships between tables 2. Identifying and resolving data inconsistencies 3. Creating calculated columns and measures **Creating Basic Visualizations** 1. Creating various chart types (bar, column, line, pie, area, etc.,) 2. Formatting and customizing visualizations **Publishing and Sharing Reports** 1. Publishing a report to Power BI Service. 2. Sharing reports and dashboards with team members. 3. Setting up data refresh schedules and managing permissions.	

Text Books:

1. Knaflic, Cole Nussbaumer. *Storytelling with Data: A Data Visualization Guide for Business Professionals.* Wiley, 1st ed., 2015.
2. Tufte, Edward. *The Visual Display of Quantitative Information.* Graphics Press USA, 2nd ed., 2001.

Reference Books:

1. Healy, Kieran. *Data Visualization: A Practical Introduction.* Princeton University Press, 2018.
2. Ferrari, Alberto, and Marco Russo. *Analyzing Data with Power BI and Power Pivot for Excel.* Microsoft Press, 1st ed., 2017.
3. Knight, Devin, et al. *Microsoft Power BI Complete Reference.* Packt Publishing, 1st ed., 2018.