COURSE LABORATORY MANUAL

A. LABORATORY OVERVIEW

Degree:	BE	Programme:	CD
Semester:	2024-25	Semester:	V
Laboratory Title:	DATA VISUALIZATION LAB	Laboratory Code:	BAIL504
L-T-P-S:	0-0-2-0	Duration of SEE:	3 Hrs
Total Contact Hours:	24	SEE Marks:	50
Credits:	1	CIE Marks:	50
Lab Manual Author:	**Prof. Chaithanya D**	Sign	Dt: 18/08/24
Checked By:	**Prof. Ajay Shastry C G**	Sign	Dt: 18/08/24

*The SEE will be conducted for 100 marks and proportionally reduced to 50 marks.

B. DESCRIPTION

1. PREREQUISITES:

- BCS358A Data Analytics with Excel

2. BASE COURSE:

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3. COURSE OUTCOMES:

At the end of the course, the student will be able to;

1. Design the experiment to create basic charts and graphs using Tableau and Power BI.
2. Develop the solution for the given real world problem.
3. Analyze the results and produce substantial written documentation.

4. RESOURSES REQUIRED:

- Tableu
- Microsoft PowerBI

Prepared by: Prof.Chaithanya D Checked by: Prof.Ajay Shastry C G HOD

5. RELEVANCE OF THE COURSE:

- BAI586 Mini Project
- BAI685 Project Phase I
- BAI786 Major Project Phase-II

6. CONTENTS:

Expt No.	Title of the Experiments	RBT	CO
1	Getting Started - Tableau Workspace, Tableau terminologies, basic functionalities.	**L3**	CO1,CO2, CO3
2	Connecting to Data Source – Connecting to Database, Different types of Tableau Joins.	**L3**	CO1,CO2, CO3

3	Creating a View - formatting charts, adding filters, creating calculated fields and defining parameters.	**L3**	CO1,CO2, CO3
4	Dashboard Design and Storytelling – Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.	**L3**	CO1,CO2, CO3
5	Introducing Power BI –Components and the flow of work. Power BI Desktop Interface-The Report has five main areas.	**L3**	CO1,CO2, CO3
6	Querying Data from CSV - Query Editor, Connecting the data from the Excel Source, Clean, Transform the data.	**L3**	CO1,CO2, CO3
7	Creating Reports & Visualizations - Different types of charts, Formatting charts with Title, Colors.	**L3**	CO1,CO2, CO3
8	Dashboards - Filters in Power BI, Formatting dashboards.	**L3**	CO1,CO2, CO3
9	Analysis of revenue in sales dataset: i) Create a choropleth map (fill the map) to spot the special trends to show the state which has the highest revenue. ii) Create a line chart to show the revenue based on the month of the year. iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue. iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field. v) Create a butterfly chart by reversing the bar chart to compare female & male revenue based on product category. vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state. vii) Build a dashboard.	**L3**	CO1,CO2, CO3
10	Analysis of GDP dataset: i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps. ii) Create a bar graph to compare GDP of Belgium between 2006 – 2026. iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010. v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006. vi) Build an interactive dashboard.	**L3**	CO1,CO2, CO3
11	Analysis of HR Dataset: i)Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age. ii) Create a Lollipop Chart to show the attrition rate based on gender	**L3**	CO1,CO2, CO3

	category. iii) Create a pie chart to show the attrition percentage based on Department Category- Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label. iv) Create a bar chart to display the number of employees by Age group, v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count. vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition – drag education field to rows, sum attrition count to col, vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.		
12	Analysis of Amazon Prime Dataset: i) Create a Donut chart to show the percentage of movie and tv shows ii) Create a area chart to shows by release year and type iii) Create a horizontal bar chart to show Top 10 genre iv) Create a map to display total shows by country v) Create a text sheet to show the description of any movie/movies. vi) Build an interactive Dashboard. vii)	**L3**	CO1,CO2, CO3
13	Open ended experiment – 1	**L3**	CO1,CO2, CO3
14	Open ended experiment – 2	**L3**	CO1,CO2, CO3

7. REFERENCE:

1. Microsoft Power BI Dashboards Step by Step by Errin O'Connor, 2019 by Pearson Education, Inc
2. Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few
3. https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorialhome.htm
4. https://www.tutorialspoint.com/tableau/index.htm
5. https://www.simplilearn.com/tutorials/power-bi-tutorial/power-bi-vs-tableau/12082024

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C. EVALUATION SCHEME

For CBCS 2021 scheme:

1. Laboratory Components: 38 Marks (Observation Writeup – 4 Marks + Lab Conduction – 15 Marks + Viva-Voce – 4 Marks + Record Writing – 15 Marks).

2. Laboratory IA tests: 12 Marks
   (Minimum 1 IA test is mandatory. IA test shall be conducted for 50 Marks; for the final IA test marks shall be converted to maximum of 12).
3. Continuous Internal Evaluation (CIE) = 38 + 12 = 50 Marks.
4. *SEE* : 50* Marks
   (*The SEE will be conducted for 100 marks and proportionally reduced to 50 marks)

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D1. ARTICULATION MATRIX

Mapping of CO to PO												
	POs											
COs	1	2	3	4	5	6	7	8	9	10	11	12
1.Design the experiment to create basic charts and graphs using Tableau and Power BI.	3	2	1	-	3				-	2	-	2
2.Develop the solution for the given real world problem.	3	3	2	2	3		1		2	2	2	3
3.Analyze the results and produce substantial written documentation.	2	2	1	3	2				2	3	2	2

Note: Mappings in the Tables D1 (above) and D2 (below) are done by entering in the corresponding cell the Correllation Levels in terms of numbers. For Slight (Low): 1, Moderate (Medium): 2, Substantial (High): 3 and for no correllation: " - ".

D2. ARTICULATION MATRIX CO v/s PSO

Mapping of CO to PSO			
	PSOs		
CO's	1	2	3
1.Design the experiment to create basic charts and graphs using Tableau and Power BI.	3	1	-
2.Develop the solution for the given real world problem.	3	2	-
3.Analyze the results and produce substantial written documentation.	2	1	-

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E. EXPERIMENTS

1. EXPERIMENT NO: 1

2. TITLE: **GETTING STARTED -** TABLEAU WORKSPACE, TABLEAU TERMINOLOGIES, BASIC FUNCTIONALITIES.

3. LEARNING OBJECTIVES:
   - - To familiarize with Tableau's workspace and understand its components.
   - - To learn basic Tableau terminologies and their functionality in visual data analysis.

4. AIM:
   - -To familiarize with Tableau's workspace and understand its components.
   - -To learn basic Tableau terminologies and their functionality in visual data analysis.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:
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7. FORMULA / CALCULATIONS:
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8. PROCEDURE / PROGRAMME / ACTIVITY:
Tableau is a powerful data visualization tool that allows users to connect, analyze, and present data interactively. The workspace in Tableau consists of several key components, including the Data

Pane, which displays the data sources and fields, and the Shelves, where users can drag fields to create visualizations. The main area of Tableau workspace is the "view," where visualizations are displayed and manipulated. The workspace also includes features like Filters, Marks, and Legends, which help in refining and adjusting the data representation. Understanding the layout of Tableau's interface and its terminologies is the first step in utilizing its capabilities for effective data analysis.

Basic Tableau terminologies are essential for navigating the software and using its features effectively. A **Data Source** refers to the dataset connected to Tableau, which can be in various formats such as Excel, SQL, or cloud-based data. **Fields** are the individual pieces of data within the dataset, such as Sales, Date, or Customer ID. Users can create **Sheets** where visualizations such as charts, graphs, and maps are created, which can later be combined into **Dashboards** for more comprehensive views of the data. **Calculated Fields** allow for the creation of new data from existing fields through expressions and formulas, making the analysis more flexible.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- - The experiment will provide a fundamental understanding of Tableau's workspace layout, helping users effectively organize and navigate through the software.
- - By mastering Tableau's key terminologies, users can work more efficiently in the creation of data visualizations, setting the foundation for advanced analytical tasks in the future.

13. LEARNING OUTCOMES :

- -After completing this experiment, users will be able to identify and describe the main components of Tableau’s workspace and utilize basic terminologies such as fields, sheets, and dashboards in building visualizations.

14. APPLICATION AREAS:

- - Business Intelligence (BI)
- - Data-Driven Reporting
- -

15. REMARKS:

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COURSE LABORATORY MANUAL

1. EXPERIMENT NO: 2

2. TITLE:

3. LEARNING OBJECTIVES:
   - - To learn how to connect Tableau to different types of data sources and databases.
   - - To understand and implement various types of joins (Inner, Left, Right, Full Outer) in Tableau for data analysis.

4. AIM:
   - - To gain practical knowledge of how to connect Tableau to external data sources, including databases.
   - - To explore different join types in Tableau and understand their impact on data relationships and analysis results.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:
   - Tableau provides robust features to connect to a wide range of data sources, such as local files, cloud services, and databases like MySQL, SQL Server, or Oracle. The process of connecting Tableau to a data source starts with selecting the correct connector and providing the necessary credentials. Once connected, Tableau allows users to import and visualize the data in its native format or after transforming it using Tableau's inbuilt tools. Connecting to databases provides a direct link to live data, ensuring that visualizations reflect the most up-to-date information available. Understanding how to connect Tableau to various data sources is critical for ensuring efficient data analysis workflows.
   - -In Tableau, data from multiple sources can be combined through different types of joins. **Inner Joins** return only the matching rows between the two datasets. **Left Joins** return all rows from the left dataset and the matched rows from the right dataset, while **Right Joins** do the reverse, returning all rows from the right dataset. **Full Outer Joins** return all rows from both datasets, matching where possible. The choice of join type affects the outcome of your data analysis, influencing the completeness and accuracy of the visualizations created. Understanding and selecting the right type of join is fundamental to building insightful data relationships.

7. FORMULA / CALCULATIONS:
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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Execution for Connecting to Data Source and Applying Joins (Example):

1. **Connect to Data Source:**
   - Open Tableau Desktop.
   - On the "Start" page, select a data source type, such as "Microsoft Excel" for local files or "MySQL" for databases.
   - For databases, enter the necessary connection details (hostname, username, password, database name).
   - After connecting, Tableau will display available tables or datasets.
2. **Load Data:**
   - Select the required table(s) to load into Tableau.

- If working with multiple tables, drag and drop them onto the "Canvas" area for combining.

3. **Implement Joins:**
   - Tableau automatically identifies relationships between tables, but you can manually set the type of join by clicking on the join icon (a circle with overlapping tables).
   - Choose the desired join type (Inner, Left, Right, Full Outer) based on your analysis needs. Each join will show a preview of the data.
4. **Finalize Data Setup:**
   - After setting up the joins, Tableau will load the data into the "Data Pane" for further use.
   - Create visualizations by dragging fields onto rows/columns shelves.
5. **Analyze and Visualize:**
   - Use Tableau's drag-and-drop interface to create visualizations such as bar charts, line graphs, or scatter plots based on the combined data.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:
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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:
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11. GRAPHS / OUTPUTS:
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12. RESULTS & CONCLUSIONS:
    - - The experiment will show how to successfully connect Tableau to external databases and how different join types affect the combined data.
    - - Proper use of joins ensures accurate data relationships, leading to more meaningful insights.

13. LEARNING OUTCOMES :
    - - After completing this experiment, users will be able to connect Tableau to various data sources, including databases, and apply different types of joins to manage and analyze data relationships effectively.

14. APPLICATION AREAS:
    - - Data Integration in Business Intelligence
    - - Data Cleaning and Transformation

15. REMARKS:
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1. EXPERIMENT NO: 3

2. TITLE: **CREATING A VIEW -** formatting charts, adding filters, creating calculated fields and defining parameters.

3. LEARNING OBJECTIVES:

- - To learn how to format charts, apply filters, and use formatting options to improve the visual presentation of data in Tableau.
- -To learn how to format charts, apply filters, and use formatting options to improve the visual presentation of data in Tableau.

4. AIM:

- - To develop skills in refining Tableau visualizations by formatting charts and applying filters.
- - To explore advanced features like calculated fields and parameters for dynamic and customized data analysis.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

In Tableau, creating a "view" refers to constructing a visualization that represents the data in a meaningful way, whether it's a simple chart or a complex dashboard. **Formatting charts** is an essential part of this process. Formatting includes changing chart types (e.g., bar, line, scatter), adjusting color schemes, font sizes, and applying borders and shading to improve readability and visual appeal. By selecting the appropriate formatting options, users can enhance the story that the data tells, making it easier to interpret. The ability to **add filters** allows users to focus on specific subsets of data, such as sales from a particular region or time period. Filters can be applied at different levels, including at the data source, worksheet, or dashboard level, to narrow down the analysis.

Calculated fields in Tableau enable users to create new data points by applying mathematical, logical, or string operations on existing fields. This is particularly useful for deriving insights like profit margins, growth rates, or custom aggregations that Tableau does not provide out of the box.

Parameters are dynamic input controls that allow users to interact with visualizations by changing values in real-time. A parameter can control a variety of factors, such as filter conditions, calculation inputs, or reference lines, providing a more interactive experience. By using parameters and calculated fields together, users can create customized, flexible visualizations that adapt to different scenarios and inputs.

7. FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

- - Step-by-Step Execution for Creating a View in Tableau

1. Open Tableau and Connect to Dataset:

- Open Tableau Desktop.
- Connect to the dataset (e.g., Excel file or database).
- Load the dataset into Tableau by selecting the desired tables.

2. Create a Basic Chart:

- After loading the dataset, go to the "Sheet" view.
- Drag a dimension (e.g., Product, Region, Date) to the Rows shelf.
- Drag a measure (e.g., Sales, Profit) to the Columns shelf.
- Tableau will automatically generate a basic chart based on the data (e.g., a bar chart or line chart).

3. Format the Chart:

- Right-click on the chart to access the "Format" option.
- Customize the chart by adjusting the font size, changing the background color, adding borders, or modifying axis labels.
- You can also adjust colors of bars or lines to make the visualization more intuitive.

4. Add Filters:

- Drag a field (e.g., "Region" or "Category") to the "Filters" shelf.
- Tableau will prompt you to select specific filter criteria (e.g., select regions to include or exclude).
- You can choose whether to show the filter on the visualization so users can interact with it.

5. Create a Calculated Field:

- In the "Data" pane, right-click and select "Create Calculated Field."
- For example, you can create a calculated field to compute **Profit Margin**:

```
scss
Copy code
Profit Margin = SUM([Profit]) / SUM([Sales])
```

- Give the field a name (e.g., "Profit Margin"), click OK, and drag it to the visualization to see the result.

6. Define and Use a Parameter:

- Right-click in the "Data" pane and select "Create Parameter."
- Set the parameter to a specific data type, such as a range of values (e.g., Sales threshold).
- Once the parameter is created, you can use it in a calculated field or filter. For instance, you could use it to dynamically change the profit margin threshold for displaying high-profit items.
- Right-click the parameter and choose "Show Parameter Control" to display it on the visualization for interactive user input.

7. Finalize the View:

- Once your chart is formatted, filtered, and enhanced with calculated fields and parameters, refine the visualization by adjusting layout and presentation.
- You can also create a dashboard by dragging the individual sheets into a single view for a more comprehensive analysis.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:
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12. RESULTS & CONCLUSIONS:
- - The experiment will help users understand how to effectively format Tableau charts and apply filters to refine the data view.
- It will also demonstrate the power of calculated fields and parameters in customizing analyses and improving interactivity within visualizations, leading to deeper insights from the data.

13. LEARNING OUTCOMES :
- - Upon completion of this experiment, users will be able to format visualizations for clarity and aesthetic appeal, apply filters to focus analysis, and create calculated fields and parameters for dynamic, tailored data analysis.

14. APPLICATION AREAS:
- - Data Reporting and Dashboards:
- - Interactive Business Analytics:

15. REMARKS:
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1. EXPERIMENT NO: 4

2. TITLE: **DASHBOARD DESIGN AND STORYTELLING** Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.

3. LEARNING OBJECTIVES:
- - To understand the components of a dashboard and how to use them effectively to tell a data-driven story.
- - To learn how to use containers and action filters to enhance interactivity and design of Tableau dashboards.

4. AIM:
- - To explore the layout and design elements of Tableau dashboards, such as containers, sheets, and legends, and how they can be arranged for effective storytelling.
- - To understand and implement action filters in Tableau, using them to create interactive dashboards that allow users to drill down into data or highlight key insights.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:

A **dashboard** in Tableau is a collection of multiple sheets (visualizations), arranged together to present an overall view of the data in a cohesive and interactive way. A well-designed dashboard provides a comprehensive overview of key metrics and insights in one place, allowing users to quickly analyze and make decisions based on the data. Dashboards can include various components

such as charts, maps, tables, filters, legends, and KPI indicators. These components should be carefully placed and aligned to ensure the dashboard is intuitive and user-friendly. Effective dashboard design also focuses on telling a compelling **data-driven story**, where the visualizations work together to communicate trends, patterns, and insights in a meaningful way.

Containers in Tableau are used to organize and group elements within a dashboard. Containers can be either **horizontal** (placing elements side by side) or **vertical** (placing elements one below the other). They help in creating a structured layout, ensuring that visualizations and filters are aligned properly. **Action filters** allow users to interact with dashboards in real-time by clicking on a visualization element (e.g., a bar or a map point) to apply a filter or highlight related data in other components of the dashboard. Tableau supports different types of action filters: **Filter Actions**, **Highlight Actions**, and **URL Actions**. Filter actions allow one visualization to filter the data shown in another, highlight actions emphasize data points in other views when clicked, and URL actions open external websites or applications based on user interaction with the dashboard. These actions enhance user engagement and provide deeper insights into the data.

7.FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Execution for Designing a Dashboard in Tableau

1. Open Tableau and Connect to Dataset:

- Open Tableau Desktop and connect to your dataset (e.g., Excel file, database).
- Load the necessary tables or sheets into Tableau.

2. Create Individual Worksheets:

- Create multiple worksheets to represent different aspects of the data. For example, one worksheet could show **Sales by Region**, another could display **Profit Trends**, and a third could present a **Category Breakdown**.
- Design and format each worksheet to focus on the key metrics you want to highlight in the dashboard.

3. Create a Dashboard:

- Navigate to the "Dashboard" tab in Tableau.
- Click on "New Dashboard" to create a new blank dashboard.
- Drag and drop the individual worksheets into the dashboard canvas.

4. Use Containers for Layout:

- To organize the visualizations, use **horizontal** or **vertical containers**. For example, use a vertical container to stack a map on top of a bar chart or a horizontal container to place two charts side by side.
- Drag a container (either horizontal or vertical) from the dashboard pane and then place the individual worksheets inside the container to align them neatly.

5. Add Filters and Legends:

- To add interactivity, you can place filters on the dashboard that allow users to filter data based on certain fields, such as **Region**, **Category**, or **Date**.
- To do this, drag the filter from the "Data" pane to the dashboard and position it where it's

easy for users to interact with.
- You can also add legends or reference lines to help users interpret the data more easily.

6. Implement Action Filters:

- To create action filters, click on "Dashboard" in the top menu and select "Actions".
- Choose **Filter Action** to link one visualization's data to another. For example, clicking on a bar in a bar chart could filter data in a related map or table.
- Set up the action to specify which fields should trigger the filter and how the data should be filtered when the user interacts with the dashboard.
- You can also set up **Highlight Actions** to highlight related data in one chart when a user clicks on data points in another chart.

7. Customize Dashboard and Interactivity:

- Fine-tune the dashboard layout by adjusting the sizes of containers and visualizations.
- Add titles, tooltips, or instructions to guide users on how to interact with the dashboard.
- Test the interactivity by clicking on filters or elements in the dashboard and observing how the visualizations respond.

8. Publish the Dashboard:

- Once satisfied with the design and interactivity, publish the dashboard to Tableau Server, Tableau Online, or export it as a PDF or image for sharing with stakeholders.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- - The experiment will demonstrate how to design interactive and visually appealing dashboards in Tableau using containers for layout, and action filters for interactivity.
- - By applying these techniques, users will be able to create dashboards that not only convey insights clearly but also encourage deeper exploration of the data through interactive elements.

13. LEARNING OUTCOMES :

- - After completing this experiment, users will be able to design dashboards with various components, effectively use containers to organize layout, and implement action filters to add interactivity and enhance the storytelling aspect of the visualizations.

14. APPLICATION AREAS:

- - Business Intelligence and Analytics
- - Data Presentation in Reporting Systems

15. REMARKS:

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1. EXPERIMENT NO: 5

2. TITLE: **INTRODUCING POWER BI :** Components and the flow of work. Power BI Desktop Interface-The Report has five main areas.

3. LEARNING OBJECTIVES:

- - To understand the key components of Power BI and how they facilitate the process of data analysis and reporting.
- - To explore the main areas of the Power BI Desktop interface and learn how to navigate through them to build interactive reports.

4. AIM:

- - To familiarize users with the layout and functionality of Power BI Desktop, enabling them to effectively design and manage reports.
- -To introduce the flow of work in Power BI, from data import to visualization, and to understand the sequence of tasks involved in building a report.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

- - Power BI is a powerful business analytics tool developed by Microsoft that allows users to connect to a wide range of data sources, analyze that data, and create interactive visualizations and reports. Power BI consists of several key components: **Power BI Desktop**, **Power BI Service**, and **Power BI Mobile**, with Power BI Desktop being the primary tool for building reports and dashboards. Power BI Desktop allows users to import data from various sources such as databases, Excel, or cloud-based services, and transform this data into meaningful visualizations.

- The **Power BI Desktop Interface** consists of five main areas:

1. **Ribbon**: The top toolbar that provides access to various functions and features, such as data import, transformations, and visualization options.
2. **Report View**: The main canvas where users create and arrange visualizations (charts, tables, maps) for their report.
3. **Fields Pane**: Displays the data fields from the imported dataset. Users can drag and drop these fields to create visualizations.
4. **Visualizations Pane**: Contains different chart types (bar, line, pie, etc.) and visual elements like slicers and KPIs. Users can choose a visual type to apply to their data.
5. **Filters Pane**: Allows users to apply filters to their reports, such as filtering by date, category, or other data attributes.

The flow of work in Power BI typically follows a sequence from **data acquisition**, **data transformation**, **visualization design**, to **publishing the report**. First, users connect to the data source, then they clean and transform the data using Power Query Editor. After preparing the data, users create visualizations, arrange them on the report canvas, and add

interactivity (e.g., slicers or filters). The final step involves publishing the report to the Power BI Service for sharing and collaboration.

7. FORMULA / CALCULATIONS:
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8. PROCEDURE / PROGRAMME / ACTIVITY:
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9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:
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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:
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11. GRAPHS / OUTPUTS:
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12. RESULTS & CONCLUSIONS:
- - By completing this experiment, users will gain a fundamental understanding of Power BI Desktop's interface and how to navigate the five main areas to create interactive reports. The exercise will also emphasize the flow of work from data acquisition to report publication, equipping users with the skills necessary to build comprehensive data visualizations.

13. LEARNING OUTCOMES :
- - After completing this experiment, users will be able to use Power BI Desktop's interface effectively, including how to import and transform data, design visualizations, and apply filters to enhance the interactivity of reports.

14. APPLICATION AREAS:
- - Business Intelligence and Reporting:
- - Data-Driven Decision Making

15. REMARKS:
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1. EXPERIMENT NO:6

2. TITLE: **QUERYING DATA FROM CSV - QUERY EDITOR, CONNECTING THE DATA FROM THE EXCEL SOURCE, CLEAN, TRANSFORM THE DATA**

3. LEARNING OBJECTIVES:

- To establish a connection between Power BI and the dataset, leveraging Power Query to load data from an external CSV file source.
- To clean, transform, and structure the imported data for enhanced data quality and analytical efficiency in Power BI.

4. AIM:

- Enable efficient data transformation by addressing issues such as missing values, duplicate records, and inconsistent data types.
- Prepare the dataset to support clear and insightful visualizations by organizing data into meaningful categories and standardizing values.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

Querying data from CSV files and other external sources, such as Excel, is a fundamental step in data preparation and analysis, allowing users to gather and organize data for further processing. In Power BI, the Power Query Editor serves as a powerful tool for connecting to and transforming raw data from various sources, making it compatible with analysis workflows. When connecting to a CSV file, Power BI interprets the data structure and offers preview and transformation options, enabling users to manage large volumes of data quickly. Similarly, Excel files, often used in business settings, are connected in Power BI by selecting specific sheets or tables to import, ensuring only relevant data is pulled into the report. This connection process is essential for creating a reliable data pipeline, integrating data from multiple sources into a single analytical framework.

Data cleaning and transformation are crucial to ensure data quality and usability. Using Power Query, users can perform essential data cleaning tasks such as removing duplicate entries, handling null values, and reformatting columns to consistent data types. These transformations make the data more reliable and easier to analyze by removing inconsistencies and aligning formats. Additionally, Power Query allows for more advanced transformations, such as splitting or merging columns, filtering data based on conditions, and creating calculated columns, further tailoring the dataset to the analysis requirements. Through these cleaning and transformation steps, Power BI enables users to prepare data that is structured, relevant, and optimized for generating insights, forming a solid foundation for accurate and meaningful reporting.

7. FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Guide for Querying, Connecting, Cleaning, and Transforming Data in Power BI

Step 1: Connect Power BI to the CSV Data Source

1. Open **Power BI Desktop**.
2. Go to **Home > Get Data > Text/CSV** to load your CSV file (`vgsales.csv`).
3. Select the file and click **Open**.
4. In the data preview window, click **Load** to import the data, or **Transform Data** to go directly into the Power Query Editor if you need to clean and transform it.

Step 2: Open the Query Editor (Power Query)

1. If you chose **Load**, now go to **Home > Transform Data** to open Power Query Editor.
2. Power Query displays the raw data in a table format, showing all columns and rows of the dataset.

Step 3: Clean and Transform the Data

Data Cleaning Steps

1. **Remove Unnecessary Columns**:
   - Identify columns that won't be used in your analysis (e.g., irrelevant or empty columns).
   - Right-click on each unnecessary column and select **Remove**.
2. **Rename Columns**:
   - Double-click on column headers to rename them to more descriptive names if needed (e.g., renaming `Sales` to `Total Sales`).
3. **Handle Missing Values**:
   - Locate columns with missing values (they'll show `null` in cells).
   - Right-click on these cells, and select **Replace Values** or **Fill Down** (if applicable) to fill gaps, or **Remove Rows** to delete rows with missing data.
4. **Remove Duplicates**:
   - If there are duplicate entries, go to the **Home** tab, select **Remove Duplicates** to ensure data consistency.

Data Transformation Steps

1. **Change Data Types**:
   - Ensure each column has the correct data type (e.g., numbers, text, dates).
   - Click the data type icon next to each column header to change it if necessary.
2. **Add Calculated Columns or Measures** (if needed):
   - Create calculated columns for additional analysis. For example, if you need `Total Revenue` as a derived metric from `Sales Units` * `Price per Unit`, go to **Add Column** > **Custom Column** and enter the formula.
3. **Filter Data**:
   - Apply filters to remove unwanted data based on conditions (e.g., excluding certain years or platforms). Use **Filter Rows** by selecting the column, then **Choose Condition**.
4. **Split or Combine Columns**:
   - If any columns contain multiple pieces of information (e.g., `Date` with time details), you can split them using **Split Column**.
   - Conversely, combine multiple columns into one if needed for a new category.

Step 4: Apply Transformations and Load Data

1. Once data is clean and structured, click **Close & Apply** in the Power Query Editor.
2. Power BI will load the cleaned data into the data model.

Example Transformation in Power Query Editor

Suppose your `vgsales.csv` dataset has columns for `Year`, `Platform`, `Genre`, `Region Sales`, and `Global Sales`. The transformations might look like this:

1. **Rename Columns**: `Region Sales` → `Sales by Region`, `Global Sales` → `Total Global Sales`.
2. **Change Data Types**: Ensure `Year` is a date type, `Sales` columns are numerical.
3. **Remove Rows with Missing Values** in `Year` column, as incomplete data could skew yearly analysis.
4. **Filter Rows** to exclude any `Platform` values where data is incomplete or not relevant.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- The data was successfully queried, cleaned, and transformed, resulting in a structured dataset that facilitated clear visualizations and accurate insights into trends such as sales distribution by platform, genre, and region.

13. LEARNING OUTCOMES :

- Gained proficiency in using Power Query for data transformation tasks, including data cleaning, handling missing values, and setting appropriate data types, which are essential skills for data preparation in analytics.

14. APPLICATION AREAS:

- Sales Analysis and Forecasting
- Market Trend Analysis

15. REMARKS:

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1. EXPERIMENT NO:7

2. TITLE: **CREATING REPORTS & VISUALIZATIONS - DIFFERENT TYPES OF CHARTS, FORMATTING CHARTS WITH TITLE, COLORS**

3. LEARNING OBJECTIVES:

- To create various types of charts (e.g., bar, line, pie) in Power BI to analyze and represent sales data effectively.
- To apply formatting techniques, including titles, colors, and data labels, to enhance the readability and aesthetic appeal of the visualizations.

4. AIM:

- Enable clear and meaningful insights into the data by using appropriate chart types for different aspects (e.g., genre distribution, sales trends by year).
- Improve report accessibility and understanding by applying consistent formatting across all charts, including relevant titles, color schemes, and labels.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

Data visualization is a critical component of business intelligence (BI), enabling users to translate complex datasets into visually accessible formats that support data-driven decision-making. Power BI is a powerful tool within the BI landscape, allowing users to connect, model, and visualize data from various sources. Different types of charts, such as bar charts, line charts, and pie charts, serve distinct purposes depending on the data structure and analysis goals. Bar charts, for example, are effective for comparing categorical data, while line charts are commonly used for illustrating trends over time. Pie charts, though best used sparingly, are valuable for displaying proportional relationships within a whole. Choosing the right visualization type is essential for accurately conveying insights and ensuring the report's audience can interpret the data effectively.

Formatting within Power BI, including titles, colors, and data labels, plays an equally crucial role in enhancing the report's clarity and aesthetic appeal. Titles provide context, while a consistent color scheme aids in distinguishing categories and creating a visually cohesive experience. Data labels, legends, and tooltips add layers of detail, allowing users to gather precise information without extensive data interaction. Additionally, slicers and interactive elements allow users to filter data dynamically, tailoring the visualizations to specific analysis needs. These visual and interactive features make Power BI an accessible and user-friendly tool, equipping users to transform raw data into actionable insights, which is essential in fields like sales, marketing, finance, and operations.

7. FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Execution for Creating Reports and Visualizations

1. Load the Data:

- Open Power BI Desktop.
- Go to **Home > Get Data > Text/CSV**, select your `vgsales.csv` file, and click **Load**.

2. Prepare the Data (if not done yet):

- Open **Transform Data** to inspect and clean the data as necessary.
- Ensure columns like `Year`, `Platform`, `Genre`, `Region Sales`, and `Global Sales` are correctly typed (e.g., date, text, numerical types).

3. Creating Different Types of Charts

- **Bar Chart**:
  - Go to the **Visualizations** pane, select **Stacked Bar Chart**.
  - Drag `Platform` to the **Axis** and `Global Sales` to **Values**. This will show total sales by platform.
- **Line Chart**:
  - Select **Line Chart** from the Visualizations pane.
  - Drag `Year` to the **Axis** and `Global Sales` to **Values**. This visualizes sales over time.
- **Pie Chart**:
  - Select **Pie Chart**.
  - Drag `Genre` to the **Legend** and `Global Sales` to **Values** to display sales proportions by genre.
- **Table or Matrix**:
  - Select **Table** to display detailed data by dragging fields such as `Platform`, `Year`, and `Global Sales` to the table.

4. Formatting Charts

- **Titles**: For each chart, click on the **Format** pane (paint roller icon), toggle **Title** to **On**, and enter a relevant title (e.g., "Sales by Platform").
- **Colors**: Adjust colors under **Data Colors** to assign unique colors to different data categories.
- **Data Labels**: Enable data labels to display sales values on charts for better readability.
- **Legends**: Customize the **Legend** settings for visibility, including font size and color adjustments.
- **Background and Borders**: Add borders or background colors to highlight charts as needed.

5. Interactive Elements:

- Add **Slicers** for fields like `Year`, `Platform`, and `Genre` to enable viewers to filter the visualizations.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:
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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:
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11. GRAPHS / OUTPUTS:
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12. RESULTS & CONCLUSIONS:
- The use of various charts and formatting techniques in Power BI provided an accessible and visually appealing report that highlighted key insights, such as the distribution of sales by genre, platform, and year.

13. LEARNING OUTCOMES :
- Developed skills in selecting appropriate visualization types and applying formatting options in Power BI to enhance the impact and clarity of data presentations.

14. APPLICATION AREAS:
- Business Intelligence and Sales Reporting
- Marketing Strategy Development:

15. REMARKS:
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1. EXPERIMENT NO:8

2. TITLE: **DASHBOARDS - FILTERS IN POWER BI, FORMATTING DASHBOARDS.**

3. LEARNING OBJECTIVES:
- To create a dynamic, interactive dashboard in Power BI by implementing filters that allow users to explore data by specific criteria.
- To apply formatting techniques to enhance dashboard readability, visual appeal, and consistency for effective data presentation.

4. AIM:
- To improve data accessibility and insight generation by incorporating filters that enable customized data views.
- To enhance the user experience by applying consistent formatting, color schemes, and clear titles across all dashboard elements.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

Creating dashboards in Power BI is a vital step in data reporting that allows users to interact with data in a meaningful way, enhancing the insights they can derive. Dashboards aggregate various visuals, such as charts, KPIs, and tables, into a single, cohesive layout, often representing key metrics for quick analysis. Power BI dashboards support interactivity through filters and slicers, which let users drill down into specific aspects of the data—such as by year, region, or product category—without altering the core data. Filters enable viewers to customize their view, focusing on the data most relevant to them and allowing deeper analysis without needing to modify the primary data model.

Formatting is essential to creating effective dashboards, ensuring that data is not only accurate but also easy to interpret. With Power BI's formatting tools, users can standardize colors, add titles, and adjust layouts to create visually consistent and accessible reports. Clear labels, data legends, and thoughtful use of whitespace improve readability and guide viewers through the information presented. Formatting goes beyond aesthetics; it organizes information hierarchically and emphasizes critical data points, enhancing the overall user experience and making complex data more accessible to a broader audience.

7. FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Execution for Creating Dashboards with Filters and Formatting

1. Create the Initial Dashboard Layout

- Go to the **Report View** in Power BI Desktop.
- Arrange visualizations on the canvas, adding relevant charts such as **Bar Charts** for sales by platform, **Line Charts** for sales over time, and **Pie Charts** for genre distribution.

2. Add Filters and Slicers

- **Add Slicers** for important fields:
  - From the **Visualizations** pane, select **Slicer**.
  - Drag fields such as `Year`, `Platform`, and `Genre` to each slicer, allowing users to filter the data based on these categories.
  - Customize the slicer type (e.g., dropdown or list) depending on how many options you have.
- **Filter Pane**:
  - Use the **Filter Pane** to set filters on the entire report, a specific page, or individual visuals.
  - Drag desired fields to the filter pane and apply default filter settings to tailor the dashboard view.

3. Apply Dashboard Formatting

- **Titles**: Add clear titles to each chart and slicer to make them self-explanatory.
- **Color Schemes**: Choose a consistent color scheme that aligns with the data categories (e.g., consistent colors for each platform or genre).
- **Background and Borders**: Add a background color to the dashboard or specific visuals for a cohesive design.
- **Adjust Spacing and Alignment**: Use alignment tools to keep visuals organized and ensure that slicers are accessible.

4. Finalize and Publish the Dashboard

- Review the dashboard for readability, ensuring all titles and labels are accurate.
- Save and **Publish to Power BI Service** if you need to share the dashboard with others.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- The dashboard successfully incorporates interactive filters and slicers, allowing users to explore sales data by year, genre, and platform with improved formatting that enhances usability and readability.

13. LEARNING OUTCOMES :

- Developed skills in creating interactive dashboards in Power BI, including effective filter use and formatting techniques that enhance user experience and visual clarity.

14. APPLICATION AREAS:

- Executive Reporting
- Data-Driven Marketing

15. REMARKS:

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1. EXPERIMENT NO: 9

2. TITLE: **ANALYSIS OF REVENUE IN SALES DATASET:**

i) Create a choropleth map (fill the map) to spot the special trends to show the state which has the

highest revenue.
ii) Create a line chart to show the revenue based on the month of the year.
iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue.
iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field.
v) Create a butterfly chart by reversing the bar chart to compare female & male revenue based on product category.
vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state.
vii) Build a dashboard.

3. LEARNING OBJECTIVES:

- To analyze revenue trends in different regions and product categories using advanced visualization techniques such as choropleth maps, line charts, and butterfly charts.
- To utilize calculated fields and bins to segment data, identify high-revenue regions, and differentiate between profitable and non-profitable states for actionable insights.

4. AIM:

- To visually identify and compare revenue patterns across different states, months, and demographic segments (age and gender).
- To use interactive visualizations to build a dashboard that supports strategic decision-making by highlighting revenue-generating regions and categories.

5. MATERIAL / EQUIPMENT REQUIRED:

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6. THEORY / HYPOTHESIS:

Revenue analysis in sales datasets is crucial for businesses to understand their income streams across geographic and demographic dimensions. By using Power BI's data visualization tools, businesses can identify revenue patterns, such as which states or regions are more profitable, and track revenue changes over time. A choropleth map, for instance, is useful for illustrating revenue distribution across states, making it easy to spot high-revenue areas at a glance. Similarly, line charts provide a time-series view of revenue, revealing seasonal trends and monthly fluctuations, which can help businesses plan for peak periods or identify underperforming times.

Power BI also enables the creation of custom fields and bins, which allow for more granular analysis. By segmenting age groups or creating calculated fields to compare male and female revenue by product category, organizations can uncover insights specific to certain demographics. The butterfly chart, which compares revenue across categories by gender, and the donut chart, which shows regional revenue shares, are powerful visuals for such comparisons. Calculated fields can also determine averages and classify states as profitable or non-profitable based on their revenue, enabling more strategic targeting and resource allocation. Combined in a dashboard, these insights support real-time decision-making, allowing business leaders to act on data-backed recommendations.

7. FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step-by-Step Execution in Power BI

i) Create a Choropleth Map

1. Load the0 dataset in Power BI and ensure it includes fields for `State` and `Revenue`.

2. Go to **Visualizations** and select the **Map** visual.
3. Drag `State` to the **Location** field and `Revenue` to **Size**.
4. Use **Data Colors** under the **Format pane** to fill states by revenue levels, highlighting states with the highest revenue.

ii) Create a Line Chart for Monthly Revenue

1. Ensure the dataset has a **Date** or **Month** field; if not, create one using Power Query.
2. Select the **Line Chart** visual from the Visualizations pane.
3. Drag the **Date** or **Month** field to the **Axis** and **Revenue** to the **Values**.
4. Format the line chart with appropriate labels and titles.

iii) Create a Bin of Size 10 for Age

1. Right-click on the `Age` field in the **Fields** pane, then select **New Group**.
2. Set the **Bin size** to 10 to create age segments (e.g., 0-10, 10-20).
3. Use this age bin as a new dimension by adding it to your visualizations (e.g., bar chart or table) to show revenue distribution by age group.

iv) Create a Donut Chart for Revenue by Region

1. Select the **Donut Chart** from the Visualizations pane.
2. Drag `Region` to the **Legend** and `Revenue` to the **Values**.
3. Create a calculated field for revenue percentage if needed, and apply this field to display percentages.
4. Adjust the **Inner Radius** under the Format pane to create a clear donut chart.

v) Create a Butterfly Chart for Gender-Based Revenue

1. Create a **Bar Chart** and set it to **Stacked Horizontal**.
2. Use `Product Category` as the **Axis** and split `Revenue` by `Gender` (Male/Female).
3. Reverse one bar using the **Format** pane to create a butterfly effect.
4. Adjust colors for each gender for clarity.

vi) Create a Calculated Field for Average Revenue per State

1. Go to **Modeling** > **New Measure** and enter a formula like:

```
AverageRevenue = AVERAGE('Table'[Revenue])
```

2. Use this field to classify states as profitable or non-profitable based on a threshold (e.g., higher than the national average).
3. Display results using a **Table** visual with conditional formatting.

vii) Build the Dashboard

1. Arrange all visuals created on a single dashboard page.
2. Use slicers for dimensions like `Year`, `Gender`, and `Age` for interactive filtering.
3. Format each visual with consistent colors and titles for a polished look.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- The dashboard successfully showcases revenue insights, identifying high-revenue states, seasonal trends, and demographic segments, supporting a deeper understanding of revenue sources.

13. LEARNING OUTCOMES :

- Developed skills in Power BI's advanced visualizations, including creating maps, custom bins, calculated fields, and interactive dashboards for comprehensive revenue analysis.

14. APPLICATION AREAS:

- **Regional Sales Strategy:**
- **Product Development and Marketing**

15. REMARKS:

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1. EXPERIMENT NO:10

2. TITLE: **ANALYSIS OF GDP DATASET:**

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.
ii) Create a bar graph to compare GDP of Belgium between 2006 – 2026.
iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.
iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.
v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.
vi) Build an interactive dashboard.

3. LEARNING OBJECTIVES:

- To visualize and analyze GDP data across different countries and regions using symbol maps, bar charts, pie charts, and scatter plots to understand geographic and temporal GDP

trends.
- To create an interactive dashboard that allows comparisons of GDP metrics for selected countries, aiding in economic data analysis.

4. AIM:
- To use various visualization techniques to explore GDP data by geographic location, time period, and country for targeted insights.
- To present GDP data in a clear, interactive format, enabling detailed analysis of specific countries and their economic standing over time.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:

Analyzing and visualizing GDP data helps to understand economic trends across countries and over time, offering valuable insights into economic growth, stability, and potential for development. GDP is a key economic indicator, often used to assess a country's economic health and to compare it to other regions. In Power BI, symbol maps, bar graphs, pie charts, and scatter plots serve as effective tools for visualizing GDP metrics. Symbol maps can pinpoint countries geographically, helping to quickly spot regions with high or low GDP values, while bar graphs and pie charts offer categorical comparisons. For instance, bar graphs are ideal for comparing GDP over a specific time period, while pie charts show GDP distribution among multiple countries in a given year.

Power BI's dashboard functionality enhances the analysis by enabling interactive filtering, which lets users compare countries or track GDP fluctuations over time dynamically. By creating a dashboard with these visualizations, users can drill down into specific countries, compare GDP between selected regions, and observe patterns in economic growth. Such a dashboard allows policymakers, researchers, and business analysts to derive actionable insights, improving their understanding of the global economy and guiding decisions based on historical GDP data trends.

7. FORMULA / CALCULATIONS:
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8. PROCEDURE / PROGRAMME / ACTIVITY:

i) Visualize Countries with Symbol Maps

1. Open Power BI and load the **GDP dataset**.
2. Select the **Map** visualization from the Visualizations pane.
3. Drag the **Country** field to **Location**, and add **Latitude** and **Longitude** fields to pinpoint each country.
4. Use **Data Labels** to display country names, and add **GDP** to the **Size** field to represent GDP by symbol size.

ii) Create a Bar Graph for Belgium's GDP (2006–2026)

1. Select the **Bar Chart** visualization from the Visualizations pane.
2. Filter the data to display only Belgium and the years 2006–2026.
3. Drag **Year** to the **Axis** and **GDP** to **Values** to show GDP changes over time.
4. Format the chart with titles and colors for clarity.

iii) Create a Pie Chart for GDP in 2010 (Selected Countries)

1. Select the **Pie Chart** visualization.
2. Filter the data to the year 2010 and the countries **India, Nepal, Romania, South Asia, Singapore**.
3. Add **Country** to **Legend** and **GDP** to **Values** to display GDP as a percentage of the whole for 2010.

iv) Visualize GDP Comparison for Bhutan & Costa Rica

1. Use a **Line and Clustered Column Chart** to display the GDP of Bhutan and Costa Rica.
2. Filter data for the years available in the dataset for these countries.
3. Add **Country** to the **Legend** and **Year** to the **Axis**, with **GDP** as **Values**.

v) Create a Scatter Plot for GDP of Mexico, Algeria, Fiji, and Estonia (2004–2006)

1. Select the **Scatter Chart** visualization.
2. Filter the data to show only Mexico, Algeria, Fiji, and Estonia, and the years 2004–2006.
3. Add **Year** to **X-Axis** and **GDP** to **Y-Axis**.
4. Use **Country** as the Legend, and format as circles for easy comparison.

vi) Build the Dashboard

1. Arrange all visuals on a dashboard page for an organized, interactive view.
2. Add slicers for dimensions like **Year** and **Country** for dynamic filtering.
3. Ensure consistent formatting, adding clear titles and labels for each visual.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- The interactive dashboard provides comprehensive insights into GDP trends across various countries and years, highlighting significant differences in economic performance and growth trajectories.

13. LEARNING OUTCOMES :

- Gained experience in visualizing geographic and economic data, utilizing Power BI's

mapping and charting tools to analyze and compare GDP across regions.

14. APPLICATION AREAS:
- **Economic Policy Analysis**
- **Global Market Research**

15. REMARKS:
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1. EXPERIMENT NO:11

2. TITLE: **ANALYSIS OF HR DATASET:**

i)Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age.
ii) Create a Lollipop Chart to show the attrition rate based on gender category.
iii) Create a pie chart to show the attrition percentage based on Department Category- Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label.
iv) Create a bar chart to display the number of employees by Age group,
v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count.
vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition – drag education field to rows, sum attrition count to col,
vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.

3. LEARNING OBJECTIVES:
- To analyze employee attrition patterns using key performance indicators (KPIs) and various chart types for insights based on demographic and job-related factors.
- To explore trends in attrition rate by factors such as gender, age group, and department, using interactive visualizations to aid HR decision-making.

4. AIM:
- To create a comprehensive set of visualizations and KPIs that offer HR departments clear insights into employee attrition and satisfaction patterns.
- To segment employee data by demographic and department categories, supporting targeted initiatives to reduce attrition and improve employee satisfaction.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:

Analyzing HR data through visualizations and KPIs allows organizations to gain a deeper understanding of employee retention and attrition patterns. Attrition, or the rate at which employees leave an organization, is a critical HR metric that impacts workforce stability and organizational effectiveness. By segmenting attrition data by factors such as gender, age group, and department, HR professionals can identify high-risk groups, recognize patterns, and develop strategies to improve employee engagement and retention. In Power BI, KPIs summarize critical metrics like attrition count, attrition rate, active employees, and average age, providing a top-level view of workforce dynamics.

Visualizations, such as lollipop charts, pie charts, and bar charts, make it easier to spot trends in

attrition across various categories. For example, a lollipop chart can reveal gender-based differences in attrition rates, while a bar chart segmented by age group helps to identify demographic patterns. Highlight tables and donut charts provide further granularity, showcasing job satisfaction ratings by role or attrition rates by gender and age group. With these insights, HR teams can address specific issues, improve workplace policies, and foster a more engaging environment to retain valuable employees.

7.FORMULA / CALCULATIONS:

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8. PROCEDURE / PROGRAMME / ACTIVITY:

i) Create KPI to Show Employee Count, Attrition Count, Attrition Rate, Active Employees, and Average Age

1. **Employee Count**: Create a card visual, add the field for total **Employee ID** (count).
2. **Attrition Count**: Create another card visual with the total **Attrition** field count.
3. **Attrition Rate**: Use a DAX formula like:Display this as a card visual.

   AttritionRate = DIVIDE(CALCULATE(COUNT('Employee'[Attrition]), 'Employee'[Attrition] = "Yes"), COUNT('Employee'[EmployeeID]), 0)

4. **Active Employees**: Use another card visual with a filter to exclude attrition cases.
5. **Average Age**: Create a final card visual to show the average of the **Age** field.

ii) Create a Lollipop Chart for Attrition Rate by Gender

1. Select a **Line and Stacked Column Chart**.
2. Drag **Gender** to the Axis and **Attrition Rate** to the Values.
3. Adjust the line and column settings under **Format** to create a lollipop effect by emphasizing the attrition rate bar.

iii) Create a Pie Chart for Attrition Percentage by Department

1. Choose the **Pie Chart** visual and drag **Department** to **Legend**.
2. Change the **Color** to represent each department differently.
3. Add **Attrition Count** to **Values** and format to display as percentages.
4. Edit labels to show counts, percentages, and total count.

iv) Create a Bar Chart for Number of Employees by Age Group

1. In Power BI, create bins for the **Age** field by right-clicking on it and selecting **New Group**.
2. Set an appropriate bin size (e.g., 5 or 10 years).
3. Use a **Clustered Bar Chart** and drag **Age Group** (bins) to the Axis and **Employee Count** to Values.

v) Create a Highlight Table for Job Satisfaction by Job Role

1. Choose the **Matrix** visualization.
2. Add **Job Role** to Rows and **Job Satisfaction Rating** to Values.
3. Apply conditional formatting to highlight different levels of job satisfaction.

vi) Create a Horizontal Bar Chart for Attrition by Education Field

1. Select a **Stacked Bar Chart**.
2. Drag **Education Field** to the Axis and **Attrition Count** to Values.
3. Format bars to distinguish each education field's attrition levels.

vii) Create Multiple Donut Charts for Attrition Rate by Gender and Age Group

1. Create a **Donut Chart** and set **Gender** as Legend, **Attrition Count** as Values, and filter by different **Age Groups**.
2. Duplicate the donut chart, creating copies filtered by specific age groups, for side-by-side comparison.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:

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12. RESULTS & CONCLUSIONS:

- The dashboard visualizations effectively illustrate employee attrition by various demographic and job-related categories, highlighting specific trends, such as higher attrition rates in particular age groups or departments.
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13. LEARNING OUTCOMES :

- Gained proficiency in creating and interpreting HR-related KPIs and visualizations in Power BI, enabling data-driven insights into workforce attrition and satisfaction.

14. APPLICATION AREAS:

- Talent Retention Strategies
- Policy Development:

15. REMARKS:

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1. EXPERIMENT NO:12

2. TITLE: **ANALYSIS OF AMAZON PRIME DATASET:**
i.Create a Donut chart to show the percentage of movie and tv shows
ii.Create a area chart to shows by release year and type
iii.Create a horizontal bar chart to show Top 10 genre
iv.Create a map to display total shows by country
v.Create a text sheet to show the description of any movie/movies.
vi.Build an interactive Dashboard.

3. LEARNING OBJECTIVES:
- To analyze the distribution of content types (movies and TV shows) available on Amazon Prime.
- To understand the geographic distribution of Amazon Prime content and identify top genres.

4. AIM:
- To create visualizations that provide insights into Amazon Prime's content library for strategic decision-making.
- To build an interactive dashboard for user-friendly exploration of Amazon Prime video metadata.

5. MATERIAL / EQUIPMENT REQUIRED:
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6. THEORY / HYPOTHESIS:
The analysis of streaming content data is critical for understanding consumer preferences, regional content availability, and strategic content curation. As streaming platforms expand globally, analyzing content across countries and genres enables platforms like Amazon Prime to optimize content libraries according to audience demands.

Furthermore, understanding the mix of content types (movies vs. TV shows) aids in marketing and platform positioning. Visualizations like donut charts, area charts, and maps facilitate a quick and interactive understanding of such datasets, which is essential in data-driven decision-making in the streaming industry.

7. FORMULA / CALCULATIONS:
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8. PROCEDURE / PROGRAMME / ACTIVITY:

Step 1: Load the Dataset

1. Open Power BI Desktop.
2. Import the dataset by selecting **Get Data** > **Text/CSV** > choose the `amazon_prime_titles.csv` file.
3. Review and load the data into Power BI.

Step 2: Data Preparation

1. Check the dataset for any missing or erroneous values.
2. Use the **Transform Data** option to clean the data if necessary, such as filling or removing null values in relevant columns like `country`, `release_year`, or `type`.

Step 3: Create Visualizations

i. Donut Chart for Percentage of Movies and TV Shows

1. Go to the **Visualization Pane** and select the **Donut Chart**.
2. Drag the `type` column to the **Legend** field and a count of `type` to the **Values** field.
3. Format the chart to display percentages and add a title, such as "Percentage of Movies and TV Shows."

ii. Area Chart for Release Year by Type

1. Select the **Area Chart** from the Visualization Pane.
2. Drag `release_year` to the **Axis** field.
3. Drag `type` to the **Legend** field.
4. Drag a count of `type` to the **Values** field to show the number of titles by year.
5. Format the chart with appropriate axis titles and colors.

iii. Horizontal Bar Chart for Top 10 Genres

1. Create a **Bar Chart** (horizontal orientation).
2. Drag `genre` to the **Axis** field and count of `genre` to **Values**.
3. Sort by the count of `genre` in descending order.
4. Filter to show only the top 10 genres using the **Top N filter**.
5. Customize chart labels and colors for clarity.

iv. Map to Display Total Shows by Country

1. Select the **Map** visualization.
2. Drag `country` to the **Location** field.
3. Drag the count of `title` to the **Size** field to display the number of shows per country.
4. Adjust map settings for appropriate zoom level and clarity.

v. Text Sheet for Movie Descriptions

1. Create a **Text Box** visualization.
2. Add a filter on `title` to dynamically display descriptions of any selected movie or group of movies.
3. Format the text box for readability.

vi. Interactive Dashboard

1. Arrange the visualizations on the Power BI canvas to create an interactive dashboard.
2. Add slicers for fields such as `release_year`, `genre`, and `type` for dynamic filtering.
3. Enable **Page Navigation** and **Interactions** to ensure slicers and charts are interconnected.

9. BLOCK / CIRCUIT / MODEL DIAGRAM / REACTION EQUATION:

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10. OBSERVATION TABLE / LOOKUP TABLE / TRUTH TABLE:

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11. GRAPHS / OUTPUTS:
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12. RESULTS & CONCLUSIONS:
    - The dashboard reveals a clear distribution of movies and TV shows on Amazon Prime, highlights the top genres, and shows the geographical spread of content.

13. LEARNING OUTCOMES :
    - Mastery of Power BI visualization techniques for complex datasets and understanding how to link multiple visuals interactively.

14. APPLICATION AREAS:
    - Content Strategy Development
    - Market Expansion Analysis

15. REMARKS:
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