

INT374:DATA ANALYTICS WITH POWER BI

L:2 T:0 P:2 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: understand the setup, interface, and basic features of Power BI for data visualization

CO2 :: grasp and apply data preparation and transformation in Power BI.

CO3 :: apply data modeling techniques, including relationships, schemas, and hierarchies, to structure data in Power BI.

CO4 :: use DAX functions and calculations to create measures, columns, and advanced data insights in Power BI.

CO5 :: analyze and design user-friendly dashboards and interactive reports with effective design and advanced visualizations.

CO6 :: examine report performance using Power BI tools and best practices

Unit I

Getting Started with Power BI : Overview of Power BI: Understanding the capabilities and applications of Power BI in data analysis and visualization., Installation and Setup: Step-by-step instructions for downloading and installing Power BI Desktop., Interface and Workflow: Familiarizing with the Power BI interface, including the report, data, and model views, and an overview of the workflow., Adjusting Settings: Configuring initial settings for Power BI, including region, language, and data loading preferences.

Unit II

Connecting and Preparing Data : Power BI Front-End vs. Back-End: Distinguishing between Power BI's front-end (report view) and back-end (Power Query Editor) functionalities., Data Connectors: Understanding different types of data connectors (Excel, SQL Server, Web, etc.) and importing data into Power BI., Power Query Editor: Using Power Query Editor to shape and clean data., Basic Table Transformations: Techniques for renaming, moving, and shaping tables and columns., Database Connections: Steps to connect Power BI to databases for live or imported data., Extracting Data from the Web: Techniques for importing web-based data sources., Data QA & Profiling Tools: Performing quality checks and profiling on data sources, Data Transformation Tools: - Text Tools: Data cleansing functions for text fields. - Numerical Tools: Transforming and aggregating numeric data. - Date & Time Tools: Working with date/time data transformations., - Advanced Transformations: - Change Type with Locale: Adapting data types based on region-specific formats. - Index & Conditional Columns: Creating index columns and conditional logic columns. - Grouping & Aggregating: Summarizing data by groups. - Pivoting & Unpivoting Data: Transforming data layouts. - Merging Queries: Combining data from multiple sources. - Data Source Settings: Managing data source configurations.

Unit III

Building and Structuring Data Models : Data Modeling Fundamentals: Core principles of data modeling in Power BI., Database Normalization: Structuring data for efficiency by organizing tables., Fact & Dimension Tables: Identifying and differentiating fact tables and dimension tables., Relationships and Keys: Using primary and foreign keys to create table relationships., Managing Relationships: - Creating and Editing Relationships: Establishing relationships between tables. - Relationship Types: One-to-one, one-to-many, and many-to-many relationships., - Schemas: - Star Schema: Building a central fact table with dimension tables around it. - Snowflake Schema: Using dimension tables connected in a more normalized structure. - Filter Context and Flow: Understanding how filters propagate through a model. - Bi-Directional Filters & Ambiguity: Managing filters in complex data models. - Data Formats & Categories: Applying appropriate formats and data categories. - Creating Hierarchies: Structuring data into hierarchies for d

Unit IV

Advanced Calculations with DAX : Introduction to DAX: Understanding the DAX language, its syntax, and primary uses., Calculated Columns & Measures: Creating new data fields using calculations., Implicit vs. Explicit Measures: Understanding the difference between these measure types., DAX Syntax & Operators: Core syntax rules and mathematical/logical operators., DAX Functions: - Basic Math & Statistical Functions: SUM, AVG, COUNT, and more. - Conditional & Logical Functions: IF, SWITCH, AND, OR, etc. - Text Functions: CONCATENATE, LEFT, RIGHT, etc. - Date & Time Functions: NOW, TODAY, YEAR, etc., Advanced DAX Functions: - CALCULATE and FILTER: Applying filters within DAX expressions. - RELATED Function: Joining tables with DAX. - Iterator (X) Functions: Advanced row-by-row calculations with functions like SUMX, AVERAGEX.

Unit V

Designing and Enhancing Visual Reports : Dashboard Design Framework: Principles of effective dashboard design., Sketching the Layout: Planning the layout and structure of the dashboard., Report Pages & Objects: Adding, renaming, and organizing report pages and objects, Visualizations: - Basic Chart Types: Line, bar, and donut charts. - Advanced Visuals: KPIs, gauges, and cards. - Trend Lines & Forecasts: Using trend lines to show projections. - Table & Matrix Visuals: Setting up tables and matrices with conditional formatting. - Map Visuals: Using geographic data for map visuals. - Report Slicers: Adding slicers for filtering data., Filtering Options: - Top N Filtering: Displaying only the top items. - Conditional Formatting: Applying visual cues based on conditions.

Unit VI

Optimizing Power BI Performance : Optimization Tools: - Optimize Ribbon: Using Power BI's optimization features. - Optimization Presets: Using predefined settings to enhance performance. - Performance Analyzer: Analyzing report performance and troubleshooting issues.

List of Practicals / Experiments:

Practical Exercises:

- Dashboard Layout Design: Sketch and build a basic dashboard layout.
- Chart Formatting: Experiment with formatting and customizing various chart types.
- DAX Functions: Practice using DAX for calculated fields, measures, and conditions.
- Data Modeling with Multiple Fact Tables: Connect multiple data sources with complex relationships.
- Using the Optimize Ribbon: Enhance report performance through optimization techniques.
- Performance Analyzer: Assess and improve report speed and efficiency.

Text Books:

1. MASTERING POWER BI BY CHANDRAISH SINHA, BPB PUBLICATIONS. by CHANDRAISH SINHA, BPB PUBLICATIONS

References:

1. POWER BI DATA MODELING BY NISAL MIHIRANGA, BPB PUBLICATIONS by NISAL MIHIRANGA, BPB PUBLICATIONS