**Assignment - Creating Dashboard with Visualization Tool**

### **1) What is Power BI and how does it differ from Excel?**

Power BI is a Microsoft business analytics tool used to visualize and share data insights.  
 Unlike Excel, Power BI handles larger data volumes, supports automated refreshes, and offers interactive dashboards and advanced data modeling.  
 Excel is more manual and spreadsheet-focused, while Power BI is built for reporting and automation.

### **2) Explain the concept of data modeling in Power BI.**

Data modeling is the process of organizing data from multiple sources into structured tables with relationships.  
 It includes setting up primary keys, foreign keys, calculated columns, and measures.  
 A well-designed model ensures efficient performance and accurate reporting.

### **3) What are the different types of connections available in Power BI?**

* **Import**: Data is loaded into Power BI memory for fast performance.
* **DirectQuery**: Queries data in real time from the source.
* **Live Connection**: Connects live to services like SSAS with no data stored in Power BI.

### **4) How do you handle data transformation in Power BI?**

Data transformation is done using Power Query Editor, where you clean and shape data before analysis.  
 Common steps include removing columns, filtering rows, changing data types, and merging tables.  
 These transformations are recorded as steps and can be edited or undone.

### **5) What is DAX (Data Analysis Expressions) and why is it important in Power BI?**

DAX is a formula language used in Power BI for creating custom calculations like measures and calculated columns.  
 It enables advanced analytics, dynamic filtering, and business logic implementation.  
 DAX helps turn raw data into meaningful insights.

### **6) Can you explain the difference between calculated columns and measures in Power BI?**

**Calculated columns** are created row by row in a table and stored in the data model.  
 **Measures** are dynamic calculations evaluated at query time and not stored.  
 Measures are better for performance; columns are useful for filtering and grouping.

### **7) How do you handle relationships between tables in Power BI?**

Relationships link tables using common fields (keys) and are managed in Model View.  
 You define cardinality (e.g., one-to-many), cross-filter direction, and active status.  
 These relationships enable accurate calculations across multiple tables.

### **8) What is the purpose of a Power BI Gateway?**

A Power BI Gateway connects on-premises data sources to the Power BI Service.  
 It enables scheduled refreshes and real-time queries from local databases.  
 There are two types: Personal and Enterprise Gateway, based on user needs.

### **9) How can you schedule data refresh in Power BI Service?**

After publishing a report, go to the dataset settings and enable "Scheduled Refresh".  
 Set frequency, time slots, and configure credentials or gateway if needed.  
 This ensures your dashboards always show updated data without manual effort.

### **10) Explain the concept of row-level security in Power BI**

Row-Level Security (RLS) restricts access to specific rows in a dataset based on user roles.  
 You define filters using DAX and assign users to roles in the Power BI Service.  
 It ensures each user sees only the data relevant to them.

### **11) What is Power BI Desktop and how does it differ from Power BI Service?**

Power BI Desktop is a free Windows app used to import, model, and visualize data.  
 Power BI Service is a cloud platform to publish, share, and collaborate on reports.  
 Desktop is for report development; Service is for distribution and refresh scheduling.

### **12) Explain the concept of DirectQuery in Power BI.**

DirectQuery allows real-time data querying without importing it into Power BI.  
 It sends queries to the source every time a visual is used.  
 Useful for large or frequently updated data but has some limitations on modeling and performance.

### **13) What are Power BI templates and how are they useful?**

Power BI templates (.PBIT files) store report layout, queries, and model structure without data.  
 They allow users to reuse report designs across different datasets.  
 This saves time and ensures consistency in report development.

### **14) How do you handle incremental data refresh in Power BI?**

Incremental refresh loads only new or changed data instead of the full dataset.  
 It's configured using parameters like RangeStart and RangeEnd in Power BI Desktop.  
 You define it under "Manage Parameters" and publish the model to Power BI Service.

### **15) What is the role of Power Query in Power BI?**

Power Query is a tool used for data transformation before it's loaded into the model.  
 It helps clean, merge, filter, and shape data through a user interface.  
 All steps are recorded in M language and can be modified anytime.

### **16) Explain the difference between calculated columns and calculated tables in Power BI.**

Calculated columns are added to existing tables using row-by-row DAX expressions.  
 Calculated tables are new tables created from DAX logic or summarizations.  
 Columns are used for filtering, while tables support modeling and advanced logic.

### **17) How do you create custom visuals in Power BI?**

Custom visuals can be imported from AppSource or developed using TypeScript and D3.js.  
 Once created, they are packaged as .pbiviz files and imported into Power BI Desktop.  
 They extend reporting capabilities beyond built-in visuals.

### **18) What are the best practices for optimizing performance in Power BI?**

Use star schema for modeling, avoid complex DAX in visuals, and reduce data size.  
 Use aggregation tables and disable unnecessary visuals during load.  
 Limit columns, avoid calculated columns when possible, and enable incremental refresh.

### **19) How can you integrate Power BI with other Microsoft products like Azure and Office 365?**

Power BI connects to Azure services like Synapse, SQL DB, and Data Lake for data.  
 It integrates with Excel, Teams, and SharePoint for sharing and collaboration.  
 You can also embed Power BI in Office 365 dashboards or use it with Power Automate and Power Apps.

### **20) Explain the concept of aggregations in Power BI.**

Aggregations summarize detailed data to improve report performance.  
 They allow Power BI to respond faster by using summary data instead of raw data.  
 Best used with large datasets to optimize queries.

### **21) How do you handle error handling and data quality in Power BI?**

Use Power Query to remove nulls, handle errors, replace values, and validate data types.  
 Set data profiling options to detect issues early.  
 Use conditional logic to handle exceptions during transformation.

### **22) What is the purpose of Power BI Embedded and when would you use it?**

Power BI Embedded allows developers to embed interactive reports into web or mobile apps.  
 It's ideal for ISVs or developers providing analytics to customers who don’t use Power BI directly.  
 It requires Azure capacity and offers secure, scalable reporting.