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

Power BI is a business intelligence tool developed by Microsoft that allows users to visualize and analyze data interactively. It provides powerful data modeling, dashboards, and report-building capabilities.

Differences from Excel:

- **Data Handling**: Power BI can process large datasets more efficiently than Excel.

- **Data Visualization**: Power BI offers interactive dashboards, whereas Excel primarily provides static charts.

- **Data Connectivity**: Power BI integrates with multiple data sources, including cloud services and databases.

- **Automation**: Power BI enables scheduled data refresh, reducing manual updates.

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

Data modeling in Power BI involves structuring and organizing data to create relationships between tables. It includes defining relationships, creating calculated columns, measures, and using DAX to enhance data analysis. A well-designed data model improves report performance and usability.

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

Power BI provides two primary types of connections:

- **Import Mode**: Data is loaded into Power BI and stored in-memory for faster performance.

- **Direct Query**: Data remains in the source, and Power BI fetches it on demand, ensuring real-time updates.

- **Live Connection**: Used with tools like SSAS (SQL Server Analysis Services), allowing real-time analysis without data import.

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

Power BI uses **Power Query Editor** for data transformation. Some key transformations include:

- Removing duplicates and null values

- Splitting or merging columns

- Changing data types

- Adding calculated columns

- Filtering and grouping data

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

DAX (Data Analysis Expressions) is a formula language used in Power BI to create custom calculations, measures, and calculated columns. It is essential for performing advanced analytics, aggregations, and business logic in reports.

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

- **Calculated Columns**: Computed at the row level within a table and stored in the data model. Example: TotalPrice = [Quantity] * [Price]

- **Measures**: Calculated dynamically at query time and do not take up additional storage. Example: TotalSales = SUM(Sales[Amount])

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

Relationships in Power BI are managed using **primary and foreign keys**. Relationships can be:

- **One-to-One (1:1)**

- **One-to-Many (1:M)**

- **Many-to-Many (M:M)**
  Users can define relationships in **Model View** and set cardinality and cross-filtering directions.

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

A **Power BI Gateway** acts as a bridge between on-premises data sources and the Power BI cloud service. It allows secure data refresh and real-time connections without moving data to the cloud.

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

In **Power BI Service**, data refresh is scheduled by:

- Navigating to **Dataset Settings**

- Enabling **Scheduled Refresh**

- Configuring refresh frequency (daily, hourly, etc.)

- Using **Power BI Gateway** for on-premises sources

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

Row-Level Security (RLS) restricts data access based on user roles. It is implemented by:

- Defining **Roles** in Power BI

- Creating **DAX Filters** to limit data access

- Assigning **Users** to specific roles in Power BI Service

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

- **Power BI Desktop**: A free application for building and designing reports locally.

- **Power BI Service**: A cloud-based platform for sharing, publishing, and collaborating on reports.

Differences:

- Power BI Desktop is used for **report creation**, while Power BI Service is for **sharing and online access**.

- Power BI Service supports **scheduled refresh**, while Power BI Desktop requires manual updates.

- Power BI Service allows publishing and **collaboration** with teams.

12) Explain the concept of Direct Query in Power BI.

Direct Query is a data connectivity mode in Power BI where the data remains in the original source, and queries are sent to retrieve results when needed. It is useful for real-time reporting and handling large datasets without importing them into Power BI.

Key Features:

- No data storage in Power BI

- Real-time updates when the source data changes

- Slower performance compared to Import mode due to query execution

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

Power BI templates (.pbit files) store report layouts, visuals, and queries without the actual data. They allow users to reuse report designs and apply them to different datasets, ensuring consistency and efficiency.

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

Incremental refresh allows Power BI to update only new or changed data instead of refreshing the entire dataset. Steps to implement it:

- Define **Range Start** and **Range End** parameters

- Configure **Incremental Refresh Policy** in Power Query

- Publish to **Power BI Service** to enable automatic incremental refresh

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

Power Query is a tool in Power BI used for data extraction, transformation, and loading (ETL). It allows users to clean, filter, and shape data before loading it into the Power BI model.

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

- **Calculated Columns**: Created at the row level within an existing table using DAX. Example: Sales[Total] = Sales[Quantity] * Sales[Price]

- **Calculated Tables**: A new table created using DAX from existing data. Example: NewTable = FILTER(Sales, Sales[Category] = "Electronics")

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

To create custom visuals:

1. Use **Power BI Developer Tools** and install **Node.js**

2. Develop visuals using **TypeScript and D3.js**

3. Package and test the custom visual

4. Import the .pbiviz file into Power BI Desktop or Service

Alternatively, you can use **Power BI Marketplace** to download pre-built custom visuals.

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

- Use **Import Mode** for faster queries

- Optimize **DAX calculations** and avoid complex nested functions

- Reduce dataset size using **aggregations and filters**

- Use **star schema** instead of a flat table

- Enable **incremental refresh** for large datasets

- Optimize **visuals and interactions** for better responsiveness

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

- **Azure**: Power BI connects to **Azure SQL Database, Azure Data Lake, Azure Synapse Analytics**, and more for real-time analytics.

- **Office 365**: Power BI integrates with **SharePoint, Excel, Microsoft Teams, and Power Automate** for seamless collaboration and reporting.

20) Explain the concept of aggregations in Power BI.

Aggregations help improve performance by storing summarized data at different levels. Power BI can use pre-aggregated data to reduce query processing time.

Example: Instead of querying millions of rows, an aggregated table stores **monthly sales totals**, improving report speed.

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

- Use **Power Query** to remove duplicates, handle null values, and clean data

- Implement **data validation rules** and alerts

- Use **DAX functions like IFERROR()** to manage errors in calculations

- Monitor **refresh errors** in Power BI Service

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

Power BI Embedded is a service that allows developers to integrate Power BI reports and dashboards into **custom applications**. It is useful for:

- Embedding analytics into web or mobile apps

- Providing reports to external users without Power BI licenses

- Creating white-label business intelligence solutions