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

Power BI is a data visualization and business intelligence tool by Microsoft. It helps in creating interactive dashboards and reports from different data sources.

**Differences from Excel:**

* Power BI is designed for data visualization and reporting, while Excel is mainly used for calculations and spreadsheets.
* Power BI handles large data better and gives interactive dashboards.
* Excel is manual, while Power BI supports automation and real-time data refresh.
* Power BI uses DAX for calculations, Excel uses formulas.

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

Data modeling in Power BI means connecting different tables and creating a structure that helps in accurate reporting. It involves:

* Creating relationships between tables (like primary and foreign keys).
* Using fact and dimension tables (star schema).
* Adding calculated columns or measures using DAX.

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

Power BI supports three main types of connections:

1. **Import** – Data is loaded and stored inside Power BI.
2. **DirectQuery** – Data stays in the source; Power BI queries it live.
3. **Live Connection** – For tools like SQL Server Analysis Services (SSAS), data is connected live without loading it.

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

Data transformation is done using **Power Query Editor**. It helps in:

* Removing errors or blanks.
* Changing data types.
* Filtering rows or columns.
* Merging or splitting columns.
* Creating new columns using custom formulas.

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

DAX is a formula language used in Power BI to create custom calculations. It is important because:

* It helps in building **measures**, **calculated columns**, and **calculated tables**.
* It allows advanced data analysis like time-based calculations, filters, totals, etc.

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

* **Calculated Columns** are created row by row in the data model. They are stored in the table.
* **Measures** are dynamic calculations done at the time of visualizing data (like total, average, etc.)

Example:  
Calculated Column → New column like “Sales = Quantity × Price”  
Measure → “Total Sales = SUM(Sales Column)”

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

* Go to **Model view** in Power BI.
* Drag and drop a field (like ID) from one table to match with another.
* Choose relationship type: One-to-many, Many-to-one, etc.
* Set cross-filter direction if needed.

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

A Power BI Gateway connects on-premises data (like SQL Server, Excel on local PC) with Power BI Service in the cloud. It helps in:

* Refreshing datasets on a schedule.
* Securing data movement between local and cloud.

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

* After publishing the report to Power BI Service:

1. Go to **Datasets** in Power BI workspace.
2. Click on **Schedule Refresh**.
3. Set refresh time, frequency, and enter credentials.
4. Save settings.

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

Row-level security (RLS) allows you to restrict data for different users. It works by:

* Creating roles in Power BI Desktop with DAX filters.
* Assigning those roles to users in Power BI Service.
* Each user sees only the data they are allowed to see.

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

* **Power BI Desktop** is a Windows application used to create and design reports.
* **Power BI Service** is the online platform to publish, share, and view reports.

**Differences:**

* Desktop is for building reports, Service is for sharing and collaboration.
* Desktop supports full data modeling; Service focuses on dashboards, refresh, and RLS.

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

Direct Query is a data connection method in Power BI where data is not imported into Power BI. Instead, queries are sent directly to the data source every time a user interacts with the report. It is useful when working with large datasets that can't be imported.

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

Power BI templates (.pbit) are reusable report files that contain:

* Report design,
* Data model,
* DAX formulas,  
  But **no actual data**.

They are useful because:

* You can share reports without sharing sensitive data.
* Save time by reusing the structure with different datasets.

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

Incremental refresh is used to refresh only new or changed data instead of reloading the full dataset. Steps:

1. Define date/time column for partitions.
2. Go to **Manage Parameters** and create RangeStart and RangeEnd.
3. Set up filters in Power Query using these parameters.
4. Configure **incremental refresh** settings under table properties.

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

Power Query is the tool used for **data loading and transformation** in Power BI. With it, you can:

* Clean and shape data (remove rows, split columns).
* Merge or append tables.
* Change data types.
* Filter and sort data before loading it into the model.

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

* **Calculated Column**: Created inside a table using DAX; calculated row by row.
* **Calculated Table**: A new table created using a DAX formula.

**Example:**

* Calculated Column → Total = Quantity \* Price
* Calculated Table → NewTable = FILTER(Sales, Sales[Amount] > 1000)

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

You can create custom visuals in two ways:

1. **Download from AppSource** – From “Visuals” pane → “Get more visuals”.
2. **Develop your own** – Using Power BI developer tools with JavaScript and the Power BI Visuals SDK.

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

* Use star schema and avoid circular relationships.
* Reduce number of visuals on a page.
* Use Import mode instead of DirectQuery if possible.
* Avoid unnecessary columns and rows.
* Use proper DAX measures instead of calculated columns when possible.
* Enable aggregations and summarization.

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

* **Azure**: Connect to Azure SQL, Blob, Data Lake, Synapse, etc.
* **Office 365**: Embed Power BI reports in **Teams**, **SharePoint**, or **Excel**.
* Use **Power Automate** for alerts and workflows.
* Use **Microsoft Entra ID (Azure AD)** for user access and security.

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

Aggregations are summaries of detailed data to improve report performance. For example:

* Instead of loading 1 million sales rows, load a summary table with totals per month.
* Power BI uses the summary unless a user drills into the detail.

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

* Use **Power Query steps** like Remove Errors, Replace Errors, and Detect Data Type.
* Use **DAX functions** like IFERROR, ISBLANK, etc.
* Create validation reports to show missing or incorrect data.
* Clean data before loading using filters, splits, merges.

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

Power BI Embedded is used to integrate Power BI reports into external applications or websites. It allows users to view reports **without having a Power BI account**.

Use it when:

* You want to show dashboards to customers on your website.
* You are building SaaS apps that need analytics for end-users.