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

Power BI is a business analytics tool used for creating interactive dashboards and reports from various data sources.

* **Differences from Excel:**
  + **Data Handling**
  + **Visualizations**
  + **Automation**
  + **Integration**

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

Data modeling involves creating relationships between different tables to organize and connect data for analysis.

* It uses a relational model with tables, primary keys, and foreign keys.
* It helps in creating a logical structure that ensures better performance and simplifies calculations.

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

There are **three types of connections**

1. **Import Mode** – Loads data into Power BI, offering high performance and fast queries but may require periodic refreshes.
2. **DirectQuery** – Connects to the data source in real-time without importing, ensuring up-to-date data but with performance trade-offs.
3. **Live Connection** – Similar to DirectQuery but used for SSAS (SQL Server Analysis Services), keeping data live without storing it in Power BI

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

Data transformation is done in Power Query Editor, where you can:

* Clean data (remove duplicates, fill missing values).
* Change data types.
* Combine datasets (merge or append queries).
* Apply calculations and filters.

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

DAX is a formula language used to create calculations and custom measures in Power BI.

* **Importance**:
  + It allows for advanced analytics
  + Helps create custom KPIs and dynamic visualizations.
  + Examples: SUM, CALCULATE, FILTER.

**6) Difference Between Calculated Columns and Measures**

* **Calculated Columns**:
  + Add new columns to tables using DAX formulas.
  + Calculations happen row by row.
  + Stored in the data model.
* **Measures**:
  + Perform calculations dynamically based on filters.
  + Results are calculated at runtime.

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

In Power BI, relationships between tables are defined in the Model View by connecting fields (keys) in tables. Relationships can be one-to-one, one-to-many, or many-to-many. I ensure relationships are correct by validating cardinality, using the Manage Relationships option, and enabling features like cross-filtering or directional filters as needed.

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

A Power BI Gateway acts as a bridge between the Power BI Service and on-premises data sources. It ensures secure data transfer, enabling scheduled refreshes or live connections to on-premises data.

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

To schedule a data refresh:

1. Publish the report to Power BI Service.
2. Go to Datasets, select the dataset, and configure the Scheduled Refresh option under Settings.
3. Define the refresh frequency and time. A Power BI Gateway may be needed for on-premises data.

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

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

**Power BI Desktop** is a local application for creating reports, visualizations, and data models.  
**Power BI Service** is a cloud-based platform for sharing, collaborating, and scheduling report refreshes. Desktop focuses on development, while Service emphasizes sharing and administration.

**12) Explain the concept of Direct Query in Power BI.**  
Direct Query enables Power BI to fetch real-time data directly from the data source without importing it. It’s ideal for handling large datasets or when real-time updates are required.

**13) What are Power BI templates, and how are they useful?**  
Power BI templates (.PBIT files) store the structure, visuals, and queries of a report but exclude the data. They allow quick creation of reports with predefined layouts and ensure consistency across multiple projects.

**14) How do you handle incremental data refresh in Power BI?**  
Incremental refresh loads only new or updated data instead of reloading the entire dataset. It is configured in the Power BI service using parameters like RangeStart and RangeEnd in Power Query, saving time and improving performance.

**15) What is the role of Power Query in Power BI?**  
Power Query is used for data preparation, allowing users to connect, transform, and clean data before loading it into Power BI for analysis.

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

* **Calculated Columns**: Add a new column to an existing table based on row-level calculations using DAX.
* **Calculated Tables**: Create a new table using DAX, often based on aggregation, filtering, or combining other tables.

**17) How do you create custom visuals in Power BI?**  
Custom visuals can be created using Power BI Developer tools with TypeScript and D3.js. They are packaged as .pbiviz files and can be imported into reports or published to the AppSource marketplace.

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

* Use Direct Query or Aggregations for large datasets.
* Avoid complex DAX calculations; pre-aggregate data.
* Minimize visuals and slicers in a report.
* Use star schema and avoid snowflake schema.
* Optimize data model size by removing unnecessary columns and rows.

**19) Explain the concept of aggregations in Power BI.**  
Aggregations allow summarizing detailed data (e.g., sums, counts) to improve performance while querying. They reduce the load on the dataset by serving summarized results for queries.

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

* Use Power Query to detect and clean null or inconsistent values.
* Implement conditional columns or replace errors in Power Query.
* Enable refresh notifications to track data issues.

**21) What is the purpose of Power BI Embedded, and when would you use it?**  
Power BI Embedded allows developers to embed Power BI reports into applications, providing analytics to app users without needing full Power BI access. It’s used in customer-facing apps or internal tools requiring interactive visuals.