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

**Power BI** is a business intelligence tool used for **data visualization, reporting, and analysis**.  
✅ **Differences from Excel**:

* **Automated data refresh** (vs. manual in Excel).
* **Better data modeling** with relationships (vs. flat tables in Excel).
* **Advanced DAX formulas** for calculations (vs. Excel functions).
* **Interactive dashboards** (vs. static reports).
* **Cloud-based sharing** via Power BI Service (vs. local Excel files).

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

**Data modeling** in Power BI refers to **structuring data** by creating relationships between tables.  
✔ Uses **relationships (one-to-many, many-to-many)** to connect tables.  
✔ Uses **DAX (Data Analysis Expressions)** to create calculations.  
✔ Supports **star & snowflake schema** for optimized performance.

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

* **Import Mode** – Loads data into Power BI for fast performance.
* **DirectQuery Mode** – Queries live data from the source without importing.
* **Live Connection** – Connects to live OLAP cubes (e.g., SSAS).
* **Composite Mode** – A mix of Import & DirectQuery for flexibility.

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

✔ Use **Power Query Editor** to clean and shape data.  
✔ Common transformations:

* **Removing duplicates & blanks**
* **Changing data types**
* **Splitting & merging columns**
* **Pivoting & unpivoting data**

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

✔ **DAX is a formula language** for creating calculated columns, measures, and tables.  
✔ Used for **aggregations, time intelligence, and custom calculations**.

**6) Difference between calculated columns and measures in Power BI?**

| **Feature** | **Calculated Column** | **Measure** |
| --- | --- | --- |
| Storage | Stored in table | Calculated on demand |
| Performance | Slower (precomputed) | Faster (computed at runtime) |
| Use Case | Row-level calculations | Aggregated calculations |

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

✔ Power BI **auto-detects** relationships, or you can create them manually.  
✔ Relationship types:

* **One-to-Many (1:*), Many-to-One (*:1)** → Most common.
* **Many-to-Many (*:*)** → Requires proper handling to avoid ambiguity.

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

✔ **Power BI Gateway** is a bridge between Power BI Service & on-premises data sources.  
✔ Used to refresh data from **SQL Server, Oracle, or local Excel files** in the cloud.

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

✔ In **Power BI Service**, go to **Datasets → Scheduled Refresh**.  
✔ Works for **Import Mode & DirectQuery** (via Gateway).  
✔ Choose **frequency & time** for automatic updates.

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

✔ **RLS** restricts data access based on user roles.  
✔ Implemented using **DAX filters** in the **Manage Roles** section.

**11) What is Power BI Desktop vs. Power BI Service?**

| **Feature** | **Power BI Desktop** | **Power BI Service** |
| --- | --- | --- |
| Purpose | Build reports & models | Share & collaborate |
| Storage | Local | Cloud-based |
| Data Refresh | Manual | Scheduled |

**12) What is DirectQuery in Power BI?**

✔ **DirectQuery** keeps data in the source instead of importing it.  
✔ Used for **real-time reports** and handling **large datasets**.  
✔ Slower performance compared to Import Mode.

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

✔ .PBIT files save a report without data.  
✔ Useful for **reusing reports** across different datasets.

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

✔ **Incremental refresh** loads only **new or updated data**, saving time.  
✔ Configured using **Power BI Service → Dataset Settings**.

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

✔ **Power Query** is used for **ETL (Extract, Transform, Load)** operations.  
✔ Cleans data **before loading** it into Power BI.

**16) Difference between calculated columns and calculated tables?**

| **Feature** | **Calculated Column** | **Calculated Table** |
| --- | --- | --- |
| Scope | Single table | New table |
| Storage | Stored in dataset | Separate table |

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

✔ Use **Power BI Custom Visual SDK** with **TypeScript & D3.js**.  
✔ Or download custom visuals from the **Power BI Marketplace**.

**18) Best practices for optimizing performance in Power BI?**

✔ Use **Import Mode** instead of DirectQuery for speed.  
✔ **Reduce number of visuals** per page.  
✔ **Use aggregations** to minimize data load.  
✔ **Optimize DAX queries** by using variables.

**19) How can Power BI integrate with Azure & Office 365?**

✔ **Azure Synapse** – Connect for big data analytics.  
✔ **Azure Data Lake** – Store & process large datasets.  
✔ **SharePoint & OneDrive** – Import Excel & CSV files.

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

✔ **Aggregations** improve performance by storing **precomputed summary data**.  
✔ Used for **handling large datasets efficiently**.

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

✔ Use **Power Query** for data cleansing.  
✔ Handle **null values & duplicates** before loading.  
✔ Set up **alerts & notifications** in Power BI Service.

**22) What is Power BI Embedded & when is it used?**

✔ **Power BI Embedded** allows developers to **integrate reports** into custom apps.  
✔ Used for **embedding dashboards** in third-party applications.