Data Vizualization With Power Bi

1. What is Power BI and how does it differ from Excel?
   Power BI is a business intelligence tool used to visualize data, build dashboards, and create reports.
   Difference from Excel:
- Power BI is mainly for visualization & dashboards, Excel is for calculation & analysis.
- Power BI handles large datasets better.
- Power BI has automated data refresh.
- Power BI supports advanced modeling & relationships.

2. Explain the concept of data modeling in Power BI.
   Data modeling means:
- Connecting multiple tables
- Creating relationships
- Cleaning and shaping data
  This helps build accurate dashboards and perform calculations using DAX.

3. What are the different types of connections available in Power BI?
   - Import Mode
   - DirectQuery
   - Live Connection
   - Composite Model (Import + DirectQuery)

4. How do you handle data transformation in Power BI?
   Data transformation in Power BI is done through Power Query Editor, where raw data is cleaned, reshaped, and prepared for analysis. It allows users to remove errors, change data types, split columns, merge tables, and perform other operations to make the data ready for modeling and visualization.

- Done in Power Query Editor
- Remove duplicates and errors
- Change data types
- Split or merge columns
- Filter and sort 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 perform calculations and build advanced analytics. It is essential for creating measures, calculated columns, and calculated tables, which help in performing complex calculations like totals, averages, filtering, and time intelligence.

- Used for calculations and logic
- Creates measures and calculated columns

- Powerful for advanced analytics
- Essential for meaningful dashboards

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

Calculated Column	Measure
Computed row-by-row	Computed on the entire dataset
Stored in the model	Calculated on the fly
Uses row context	Uses filter context
Increases file size	Does not increase file size

7. How do you handle relationships between tables in Power BI?
Relationships in Power BI define how tables are connected so data can be analyzed correctly. Power BI detects relationships automatically, but users can also create or edit them manually. A relationship ensures that filters applied in one table affect the other related tables properly.

- Create relationships using keys
- Manage via *Model View*
- One-to-many or many-to-one
- Controls filter flow between tables

8. What is the purpose of a Power BI Gateway?
A Power BI Gateway is a bridge that connects on-premises data (local servers) to the Power BI cloud service. It allows secure data updates and enables automatic refresh so that dashboards always display the latest data.

- Connects local data to the cloud
- Enables scheduled refresh
- Ensures secure data transfer
- Keeps dashboards updated

9. How can you schedule data refresh in Power BI Service?
Scheduling data refresh in Power BI Service allows datasets to update automatically at fixed intervals. After publishing a report, users can go to the dataset settings and set the refresh frequency. This ensures that dashboards always show the latest data without manual refresh.

- Go to Dataset → Settings
- Select refresh schedule
- Requires Gateway for local databases
- Auto daily/hourly refresh possible

10. Explain the concept of row-level security in Power BI.
Row-level security (RLS) restricts data access for different users based on roles. It ensures that each user sees only the data they are authorized to view. RLS is commonly used in organizations where sensitive information must be restricted by region, department, or role.

- Controls data visibility per user
- Uses roles and filters
- Protects sensitive data
- Used in large organizations

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

Power BI Desktop	Power BI Service
Build reports	Share, view, collaborate
Data modeling	Dashboards & scheduled refresh
Free software	Cloud-based service

12. Explain the concept of Direct Query in Power BI.
DirectQuery is a connection mode in Power BI where data is not imported but accessed directly from the database in real-time. This helps in handling very large datasets and ensures that reports always show the latest data.

- No data import
- Real-time data queries
- Suitable for large datasets
- Depends on database speed

13. What are Power BI templates and how are they useful?
Power BI templates are reusable report files that contain the layout, visuals, and data model but do not include the actual data. They are useful when the same report design is needed for different datasets.

- .PBIT file format
- Contains visuals + model
- Data not included
- Useful for standardized reporting

14. How do you handle incremental data refresh in Power BI?
Incremental data refresh allows Power BI to refresh only new and changed data instead of refreshing the entire dataset. This greatly improves performance and saves time, especially for large datasets.

- Refreshes only new data
- Uses Range Start/End parameters
- Faster & efficient
- Best for large tables

15. What is the role of Power Query in Power BI?
    Power Query is responsible for data transformation and preparation. It cleans, shapes, and modifies raw data before it enters the data model. This ensures that the data used for analysis is accurate and structured properly.
- Used for cleaning data
- Removes errors and duplicates
- Changes data types
- Splits and merges columns

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

Calculated Column	Calculated Table
Adds new column	Creates new table
Uses DAX row context	Uses DAX table functions
Used for relationships, grouping	Used for summarized or filtered tables

17. How do you create custom visuals in Power BI?
    Custom visuals can be created by importing visuals from the AppSource marketplace or by developing them using Power BI Developer Tools. Custom visuals help enhance dashboard design when built-in visuals are not enough.

- Import from AppSource
- Create using TypeScript + Node.js
- Useful for unique dashboards

18. What are the best practices for optimizing performance in Power BI?
    To optimize performance, Power BI reports should use a clean data model, fewer columns, proper data types, and star schema. Using measures instead of calculated columns and enabling incremental refresh also helps improve speed.

- Use star schema
- Reduce unused columns
- Prefer measures
- Use Incremental Refresh
- Avoid too many visuals

19. How can you integrate Power BI with other Microsoft products like Azure and Office 365?
Power BI integrates seamlessly with Azure services like Azure SQL, Azure Data Lake, and Synapse for large-scale data analytics. It also works with Office 365 apps like Excel, Teams, and SharePoint for smooth sharing and collaboration.

- Connects to Azure SQL
- Uses Azure AD for security
- Share reports via Teams & SharePoint
- Supports automation with Power Automate

20. Explain the concept of aggregations in Power BI.
Aggregations summarize large fact tables into smaller, optimized tables to improve performance. When Power BI performs calculations, it first checks the aggregated table, reducing the amount of data it needs to process.

- Summarizes large data
- Increases performance
- Reduces query load
- Best for big datasets

21. How do you handle error handling and data quality in Power BI?
Data quality is managed in Power Query by fixing errors, correcting data types, removing duplicates, and handling null values. Errors can be replaced, filtered, or removed to ensure accurate reporting.

- Fix null values
- Remove duplicates
- Replace or remove errors
- Set correct data types

22. What is the purpose of Power BI Embedded and when would you use it?
Power BI Embedded is used to integrate Power BI dashboards into external applications. It allows companies to provide analytics inside their own apps without requiring users to have a Power BI account. This is useful for SaaS and customer-facing applications.

- Embed dashboards in apps
- Users don't need Power BI account
- Useful for SaaS products
- Provides advanced analytics inside apps