Question 1:Define Power BI and explain key components of the Power BI ecosystem.

Power BI is a business intelligence tool developed by Microsoft that helps users collect, transform, analyze, and visualize data to make better business decisions through interactive reports and dashboards.

Key Components of Power BI:

1. Power BI Desktop

Power BI Desktop is a Windows-based application used to connect to data sources, clean and transform data using Power Query, create data models using DAX, and design reports and visualizations.

2. Power BI Service

Power BI Service is a cloud-based platform where reports created in Power BI Desktop are published. It allows sharing reports, creating dashboards, scheduling data refresh, and collaborating with others.

3. Power BI Mobile

Power BI Mobile is a mobile application available on Android and iOS that allows users to view dashboards and reports on smartphones and tablets with real-time data access.

4. Power BI Gateway

Power BI Gateway acts as a bridge between on-premises data sources and the Power BI Service, enabling secure data refresh without moving data to the cloud.

Question 2: Compare the following Power BI visuals.

Pie Chart vs Donut Chart

A Pie Chart shows parts of a whole using slices and is best for simple category comparison.

A Donut Chart is similar to a pie chart but has a hole in the center, which allows space for additional information like totals.

Preference & Example:

Use a Pie Chart when showing market share of 3–4 products.

Use a Donut Chart when displaying sales contribution by region with total sales shown in the center.

Bar Chart vs Column Chart

A Bar Chart displays data horizontally and is suitable when category names are long.

A Column Chart displays data vertically and is ideal for comparing values over time.

Preference & Example:

Use a Bar Chart for comparing sales by product category.

Use a Column Chart to show monthly sales trends.

Question 3

Explain the significance of:

Star Schema vs Snowflake Schema

Star Schema has a central fact table connected directly to dimension tables. It is simple, faster, and preferred in Power BI.

Snowflake Schema has normalized dimension tables connected to other dimensions, making it complex but storage-efficient.

Significance:

Star schema improves query performance and simplifies data modeling in Power BI.

Primary Key vs Foreign Key & Cardinality

A Primary Key uniquely identifies records in a table.

A Foreign Key connects one table to another.

Cardinality defines the relationship type (One-to-Many, One-to-One).

It is important because incorrect cardinality can produce wrong aggregations and inaccurate visuals.

Question 4

Differentiate between Calculated Column and Measure.

Also explain Row Context and Filter Context.

Calculated Column

Calculated at row level

Stored in the table

Used for static calculations

Example: Profit = Sales - Cost

Measure

Calculated dynamically

Not stored in table

Used for aggregations

Example: Total Sales = SUM(Sales)

Row Context

Row context refers to calculations performed row by row.

Example: Calculated column computing profit for each row.

Filter Context

Filter context applies filters from slicers, visuals, or report pages.

Example: Total Sales filtered by Year or Region.

Question 5

Difference between Report and Dashboard in Power BI

A Report is a multi-page interactive analysis created in Power BI Desktop.

A Dashboard is a single-page view created in Power BI Service using pinned visuals from reports.

Question 6

Clustered Bar Chart & Donut Chart using Global Superstore dataset

Clustered Bar Chart: Displays total sales by sub-category, allowing comparison across products.

Donut Chart: Shows sales percentage contribution by region.

Observation:

Technology and Furniture sub-categories contribute higher sales, and the West region has the highest sales share.

Question 7

DAX Measures and Visual Usage

DAX Measures:

Total Profit = SUM(Profit)

Average Discount = AVERAGE(Discount)

Visuals Used:

KPI Card to display Total Profit and Average Discount

Line Chart to show profit trend over months

Insight:

Profit shows seasonal variation, and higher discounts slightly reduce profit margins.

Question 8

DAX measure for percentage of total sales by product category

DAX Formula:

```
Sales % of Total =
DIVIDE(
    SUM(Sales[Sales_Amount]),
    CALCULATE(SUM(Sales[Sales_Amount]),
ALL(Sales[Product_category]))
)
```

Interpretation:

Home Appliances and Electronics contribute the highest percentage to total sales.

Question 9

Waterfall Chart – Profit Analysis

DAX Measure:

```
Total Profit = SUM(Profit)
```

Steps:

Create Waterfall Chart

Axis: Sub-Category

Values: Total Profit

Add Region slicer

Business Insights:

Technology sub-categories contribute maximum profit

Some furniture items show profit decline

Recommendations:

Reduce discounting in low-profit sub-categories

Focus marketing on high-margin products

Optimize supply chain costs

Question 10

Health Activity Dashboard – One-Page Design

Dashboard Insights:

1. Users with balanced steps and sleep show healthier BMI.

2. Smoking and alcohol intake increase heart disease risk.

3. Sleep duration has a positive correlation with physical activity.

4. BMI increases with age, especially in sedentary users.

5. Smokers show higher heart rate and blood pressure.

6. Users can be segmented into Active, Moderate, and High-Risk groups.

Conclusion:

The dashboard helps identify health risks early and supports personalized lifestyle recommendations.