SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.C.A. - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - IV
23UCACT4008 - Data Visualization

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Describe a complete data pre-processing workflow for a dataset containing customer reviews of electronic products from an e-commerce website.The dataset includes text reviews, star ratings (1-5), purchase dates, product categories, and customer demographics. Explain the specific pre-processing techniques you would apply to each data type, potential challenges you might encounter, and how these techniques contribute to effective visualization. Include considerations for handling missing values, outliers, and preparing text data for analysis.
2. Apply the principles of creating visualizations using Tableau to a train ticket reservation system. Imagine you have a dataset containing information about train routes, passenger numbers, ticket prices, and reservation dates. You need to create a dashboard in Tableau that helps administrators.
    1. Visualization of Route (2 point): Explain how you would visualize different train routes and discuss which visualization (e.g., bar chart, line chart) would be most effective.
    2. Geospatial Visualization of Train Stations (3 point): Describe how to display the locations of train stations on a map.
3. Apply the concepts of basic data visualizations to create effective charts for an insurance company. An insurance company wants to enhance its data analysis and decision-making processes using visualizations. They have datasets related to policy sales, customer demographics, claims frequency, and revenue growth. You need to design a set of visualizations to help them understand these datasets better for the following:
    1. Policy Sales by Region (1 point)
    2. Customer Demographics (1 point)
    3. Claims Frequency Over Time (1 point)
    4. Revenue Growth Comparison (1 point)
    5. Customer Retention Analysis (1 point)

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4. Solve the following problem for an online pharmacy booking system using Tableau functions. Classify the appropriate types of calculations and visualizations and predict how creating an interactive dashboard can improve decision-making.

   You need to analyse its booking data to improve operations and customer satisfaction & create a Tableau dashboard with following:

   1. Daily Total Sales Analysis (1 point)
   2. Rank Top-Selling Medicines (2 point)
   3. Classify Customer by age group(1 point)
   4. Monthly Cumulative Revenue (1 point)

5. Show how different visualization techniques can be applied to spatial and geospatial data by illustrating examples of each.

   1. One-Dimensional Data Visualization for Spatial Data (1 point)
   2. Visualization of Point Data in Geospatial Context (1 point)
   3. Three-Dimensional Data Visualization (1 point)
   4. Other Issues in Geospatial Data Visualization (2 points)

6. As a data analyst at ABC Sports, use Tableau to predict, classify, and compute key business insights from the company's two-year sales dataset. The marketing director needs visualizations to:

   1. Predict growth product categories based on historical trends
   2. Classify store locations into performance tiers
   3. Compute relationships between customer demographics and purchasing patterns

   Explain your approach to:

   1. Data Preparation and Connection (1 mark)
   2. Measure and Dimension Selection (1 mark)
   3. Visualization Selection and Design (1 mark)
   4. Predictive Visualization Implementation (1 mark)
   5. Dashboard Creation and Storytelling (1 mark)

7. As the CFO of Global Financial Bank, you need to predict, classify, and compute key financial performance metrics using data visualization techniques for an upcoming board presentation. You have quarterly data for the past 3 years covering branch performance, loan portfolios, customer deposits, operating expenses, and revenue streams.

   Explain which chart types you would use for each of these tasks and why:

   1. Risk Assessment Visualization (1 mark)
   2. Branch Performance Comparison (1 mark)

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3. Financial Trend Analysis (1 mark)
4. Budget Variance Reporting (1 mark)
5. Portfolio Composition Visualization (1 mark)

8. As the Head of Analytics for StepWise International, a global footwear retailer with stores across 50 countries, you need to ascertain, diagnose, and distinguish key business performance factors using Tableau functions and dashboard techniques.

   Explain your approach to:

   1. Sales Performance Analysis Functions (1 mark)
   2. Customer Segmentation Calculations (2 mark)
   3. Inventory Optimization Techniques (2 mark)

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. As a data scientist at a global market research firm, you need to substitute, convert, and provide examples of data preprocessing techniques for an upcoming visualization project analyzing consumer behavior trends across multiple industries.

   Demonstrate your understanding by addressing:

   1. Data Type Identification and Transformation (1 mark)
   2. Missing Data Handling Strategies (1 mark)
   3. Outlier Detection and Treatment (1 mark)
   4. Data Normalization and Standardization (1 mark)
   5. Feature Engineering and Selection (1 mark)

10. As a GIS analyst for an international conservation organization, relate, compute, and prepare spatial and geo-spatial data visualizations to help policymakers understand deforestation patterns across tropical regions.

    Create effective spatial visualizations by addressing:

    1. Spatial Data Relationship Analysis (1 mark)
    2. Geographic Coordinate Systems (2 mark)
    3. Choropleth Mapping Techniques (2 mark)

11. Differentiate between measures and dimensions in Tableau. Reduce data complexity using joins/unions. Discriminate data types to optimize visualization for a retail dataset.

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Evaluation Criteria (1 point each):

1. Differentiates measures (quantitative) vs. dimensions (categorical).
2. Reduces data using unions/joins to merge tables.
3. Discriminates data types (e.g., string vs. integer).
4. Sets up live connections vs. extracts appropriately.
5. Edits metadata (e.g., renaming fields).

12. Relate the use of different chart types to analyse sales data for a large toy-selling company. Classify the appropriate chart type for each scenario. Compute key metrics and prepare a dashboard to visualize insights effectively.

    For the below scenarios describe which visualization technique you will use:

    1. Sales by Product Category (1 point)
    2. Monthly Sales Trends (1 point)
    3. Top-Selling Regions (1 point)
    4. Customer Age Group Analysis (1 point)
    5. Interactive Dashboard (1 point)

13. Criticize the current dashboard design for a leather bags and accessories company. Compare different visualization techniques to enhance it.

    Scenarios:

    1. Sales by Product Type (1 point)
    - Criticize: Current bar charts may not show detailed trends; suggest using line charts for time-series analysis.
    - Compare: Line charts vs. bar charts for showing sales trends over time.
    2. Customer Segmentation (2 point)
    - Compare: Use logical functions to segment customers by purchase history and demographics.
    - Apprise: Explain how this segmentation aids in targeted marketing.
    3. Monthly Revenue Growth (2 point)
    - Criticize: Current waterfall charts may not clearly show cumulative sums; suggest using quick table calculations.
    - Apprise: Discuss how quick table calculations enhance understanding of revenue trends.

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