

# **SRM VALLIAMMAI ENGINEERING COLLEGE**

**(An Autonomous Institution)**

SRM Nagar, Kattankulathur – 603 203

**DEPARTMENT OF COMPUTER APPLICATIONS**

**QUESTION BANK**

**Academic Year 2025-2026**



**III SEMESTER**

**PMC302 – DATA VISUALIZATION**

**(Regulation – 2024)**

**(AY: 2025 – 26 ODD SEMESTER)**

**Prepared by**

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**Assistant Professor**



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## QUESTION BANK

**Name of the Faculty** : Mr.K.MANIRAJ  
**Course Name** : DATA VISUALIZATION  
**Course Code** : PMC302  
**Sem / Branch / Sec** : II / MCA / II  
**Academic Year** : 2024-2025 EVEN Semester

### UNIT-1 : INTRODUCTION TO DATA VISUALIZATION

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets and data visualization tools.

#### PART A

Q.No	Question	Marks	Level	Competence	Course Outcome
1	Give two examples of data visualization in the real world?	2	BTL2	Understand	CO1
2	What is the primary purpose of data visualization?	2	BTL1	Remember	CO1
3	State two methodology used in the creation of data visualizations.	2	BTL2	Understand	CO1
4	What are the objectives of data visualization?	2	BTL1	Remember	CO1
5	What is the context of data visualization?	2	BTL1	Remember	CO1
6	List out the advantages of data visualization.	2	BTL1	Remember	CO1
7	What is meant by "data representation" in the context of data visualization?	2	BTL1	Remember	CO1
8	What is the primary purpose of data presentation in the visualization process?	2	BTL2	Understand	CO1
9	Write down the key factors?	2	BTL1	Remember	CO1
10	Classify the data visualization functions	2	BTL2	Understand	CO1
11	Identify the types of data visualization functions.	2	BTL2	Understand	CO1
12	Define tone	2	BTL1	Remember	CO1
13	List out the types of tone.	2	BTL1	Remember	CO1
14	Explain the design options	2	BTL2	Understand	CO1
15	List out the types of data visualization.	2	BTL1	Remember	CO1
16	List out the different types of charts.	2	BTL1	Remember	CO1
17	How will you visualize the groups in data visualization?	2	BTL2	Understand	CO1
18	What is Data Visualization and Why is It Important?	2	BTL2	Understand	CO1
19	Define Widgets	2	BTL1	Remember	CO1
20	What is a heatmap?	2	BTL1	Remember	CO1

21	What are the different types of charts?	2	BTL2	Understand	CO1
22	Name one type of widget commonly used in data visualization dashboards.	2	BTL1	Remember	CO1
23	What is a data visualization tool?	2	BTL1	Remember	CO1
24	List out the types of tools for data visualizations.	2	BTL1	Remember	CO1

<b>PART B</b>					
<b>Q.No</b>	<b>Question</b>	<b>Marks</b>	<b>Level</b>	<b>Competence</b>	<b>Course Outcome</b>
1	Given a dataset of sales figures for a retail company, apply the principles of data visualization to create a visualization that effectively communicates sales performance across different regions.	16	BTL3	Apply	CO1
2	Given a set of temperature data over a week, suggest an appropriate representation.	16	BTL3	Apply	CO1
3	When designing data visualization what are the principles to be followed?	16	BTL3	Apply	CO1
4	In a real-time dashboard, how would you use a widget to display the current stock price?	16	BTL3	Apply	CO1
5	Recommend a data visualization tool for creating interactive charts for a web-based application.	16	BTL3	Apply	CO1
6	Compare the effectiveness of a table widget vs. a chart widget for presenting data in a financial dashboard.	16	BTL4	Analyze	CO1
7	Analyze the limitations of free vs. paid data visualization tools for business analytics.	16	BTL4	Analyze	CO1
8	Analyze the impact of color choices on the effectiveness of data presentation in a business report.	16	BTL4	Analyze	CO1
9	Compare and contrast the use of bar charts and pie charts for displaying categorical data.	16	BTL4	Analyze	CO1
10	Break down the methodology you would use for creating an interactive dashboard.	16	BTL3	Apply	CO1
11	Analyze how the tone of a visualization could influence the viewer's perception of the data.	16	BTL4	Analyze	CO1
12	Evaluate the use of 3D visualizations for presenting financial data.	16	BTL4	Analyze	CO1
13	Create a visualization for a dataset that requires a balanced approach between exploration and explanation.	16	BTL5	Create	CO1
14	Design a new approach for the data cleaning stage in data visualization, focusing on handling missing values.	16	BTL5	Create	CO1
15	Create a set of interactive widgets for a data visualization dashboard that monitors website traffic in real time.	16	BTL5	Create	CO1
16	Explain the five best widget types for showcasing the performance of data visualizations?	16	BTL3	Apply	CO1
17	Explain the Seven Stages of Data Visualization	16	BTL3	Apply	CO1

**UNIT-2 : VISUALIZATION TECHNIQUES FOR TIME-SERIES, TREES & GRAPHS**

Mapping – Time series - Connections and correlations – Indicator – Area chart-Pivot table- Scatter charts, Scatter maps – Tree maps, Space filling and non-space filling methods – Hierarchies and Recursion - Networks and Graphs-Displaying Arbitrary Graphs-node linkgraph-Matrix representation for graphs- Info graphics

**PART A**

Q.No	Question	Marks	Level	Competence	Course Outcome
1	What is a time series in data analysis?	2	BTL1	Remember	CO2
2	Explain the use of time series in mapping.	2	BTL2	Understand	CO2
3	Define correlation in data analysis.	2	BTL1	Remember	CO2
4	How do connections differ from correlations in data analysis?	2	BTL2	Understand	CO2
5	What is a data indicator?	2	BTL1	Remember	CO2
6	Why are indicators important in data visualization?	2	BTL2	Understand	CO2
7	What is an area chart?	2	BTL1	Remember	CO2
8	Describe one advantage of using area charts.	2	BTL2	Understand	CO2
9	What is a pivot table?	2	BTL1	Remember	CO2
10	How does a pivot table assist in data analysis?	2	BTL2	Understand	CO2
11	Define a scatter chart.	2	BTL1	Remember	CO2
12	How is a scatter map different from a scatter chart?	2	BTL2	Understand	CO2
13	What is a tree map?	2	BTL1	Remember	CO2
14	Explain one application of tree maps in data visualization.	2	BTL2	Understand	CO2
15	What is a space-filling visualization method?	2	BTL1	Remember	CO2
16	Compare space-filling and non-space-filling visualizations.	2	BTL2	Understand	CO2
17	What is recursion in data structures?	2	BTL1	Remember	CO2
18	How are hierarchies represented in data visualization?	2	BTL2	Understand	CO2
19	What is a node in a network graph?	2	BTL1	Remember	CO2
20	Differentiate between a node-link graph and a matrix representation for graphs.	2	BTL2	Understand	CO2
21	What is an arbitrary graph?	2	BTL1	Remember	CO2
22	Give an example where displaying arbitrary graphs is useful.	2	BTL2	Understand	CO2
23	Define an infographics.	2	BTL1	Remember	CO2
24	Why are infographics useful in communication?	2	BTL2	Understand	CO2

PART B					
Q.No	Question	Marks	Level	Competence	Course Outcome
1	(i) Explain the importance of time series analysis in forecasting.	8	BTL3	Apply	CO2
	(ii) Discuss the challenges and techniques to address missing data and outliers in time series visualizations.	8			
2	(i) Explain in detail about mapping with example.	8	BTL3	Apply	CO2
	(ii) Explain in detail about Time series with example.	8			
3	Illustrate Connections and correlations in data visualization?	16	BTL4	Analyze	CO2
4	Explain in detail.		BTL4	Analyze	CO2
	(i) Discuss about Bar chart and histograms with example.	8			
	(ii) Discuss about Scatterplot maps in detail.	8			
5	(i) Explain in detail about Trees in data visualization.	8	BTL3	Apply	CO2
	(ii) Explain in detail about Hierarchies and Recursion in data visualization.	8			
6	Explain in detail about Networks and Graphs and Info graphics that are used to visualize the data.	16	BTL4	Analyze	CO2
7	Create a map and apply the Trees, Hierarchies and Recursion techniques.	16	BTL5	Evaluate	CO2
8	Analyze the difference between space-filling methods (tree maps) and non-space-filling methods for hierarchical visualizations.	16	BTL4	Analyze	CO2
9	Discuss the use of pivot tables combined with area charts or tree maps for representing hierarchical data such as product categories and subcategories.	16	BTL4	Analyze	CO2
10	Explain the differences between scatter charts and scatter maps, and justify the use of scatter maps for geographic data analysis.	16	BTL4	Analyze	CO2
11	(i) Compare and contrast different types of time series visualizations, such as line charts, bar charts, and area charts.	8	BTL4	Analyze	CO2
	(ii) What are the strengths and limitations of each type when representing time-dependent data? Provide examples of situations where each would be most effective.	8	BTL5	Evaluate	CO2
12	(i) Explain the role of interactive elements in scatterplot maps, such as tooltips, zooming, and filtering.	8	BTL4	Analyze	CO2
	(ii) Explain the key elements of creating an effective scatterplot map, such as data point size, color, and geographic coordinates.	8	BTL4	Analyze	CO2
13	(i) Explain how recursive visualizations can be used to model hierarchical data, such as taxonomies or organizational structures.	8	BTL3	Apply	CO2
	(ii) Discuss the advantages of using recursive tree visualizations compared to flat representations, and provide an example where recursion significantly improved Understand.	8	BTL4	Analyze	CO2
14	Discuss the role of centrality measures in network analysis. What are the different types of centrality (degree, closeness, betweenness) and how are they used to analyze network data?	16	BTL3	Apply	CO2

15	Compare node-link graphs with matrix representations for modeling customer referral networks. Provide an example of when a matrix representation is more effective.	16	BTL4	Analyze	CO2
16	(i) Identify the key elements (charts, graphs, or maps) you would use in the infographic.	8	BTL3	Apply	CO2
	(ii) Briefly outline how color coding or size variations could enhance the clarity of your infographic.	8			
17	(i) Explain why a pivot table combined with a time series chart is an effective choice for product sales.	8	BTL3	Apply	CO2
	(ii) Demonstrate how a scatter chart could be used to find correlations between sales and marketing spend in different	8			

### UNIT-3 : TEXT AND DOCUMENT VISUALIZATION

Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Web Techniques, Parsing data - Levels of Effort, Tools for Gathering Clues, Text Markup Languages, Regular Expressions, Grammars and BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work.

#### PART A

Q.No	Question	Marks	Level	Competence	Course Outcome
1	What is data acquisition in the context of data analysis?	2	BTL1	Remember	CO3
2	Name two common sources where data can be found for analysis.	2	BTL1	Remember	CO3
3	What is a web scraper?	2	BTL1	Remember	CO3
4	How do APIs help in acquiring data from the internet?	2	BTL2	Understand	CO3
5	Describe the difference between absolute and relative file paths.	2	BTL2	Understand	CO3
6	What does it mean to load text data into a program?	2	BTL1	Remember	CO3
7	Why is it important to properly format text data before loading it?	2	BTL2	Understand	CO3
8	What is the purpose of organizing data into files and folders?	2	BTL1	Remember	CO3
9	What command or function is used to list files in a folder?	2	BTL1	Remember	CO3
10	How can listing files in a folder help with data organization?	2	BTL2	Understand	CO3
11	Why is asynchronous downloading useful when dealing with large image datasets?	2	BTL2	Understand	CO3
12	How is HTTP used to request and receive data from the web?	2	BTL2	Understand	CO3
13	What does it mean to parse data?	2	BTL1	Remember	CO3
14	Define levels of effort in data gathering.	2	BTL1	Remember	CO3
15	Name a tool commonly used for gathering data clues.	2	BTL1	Remember	CO3
16	What is JSON? Give the syntax	2	BTL2	Understand	CO3
17	Explain the purpose of using text markup languages like HTML or XML.	2	BTL2	Understand	CO3

18	Give the structure of HTML tag for creating table	2	BTL1	Remember	CO3
19	Explain how regular expressions help in pattern matching.	2	BTL2	Understand	CO3
20	Explain how grammars are used in defining the syntax of programming languages.	2	BTL2	Understand	CO3
21	Why is compressed data used in storage and transmission?	2	BTL2	Understand	CO3
22	What is a vector in geometric representation?	2	BTL1	Remember	CO3
23	What is a binary data format?Give example	2	BTL1	Remember	CO3
24	Explain how combining different data sources can lead to new insights.	2	BTL2	Understand	CO3
<b>PART B</b>					
Q.No	Question	Marks	Level	Competence	Course Outcome
1	Discuss in detail about the Tools for Acquiring Data.	16	BTL3	Apply	CO3
2	How to Locate Files for use with Processing.Give example	16	BTL3	Apply	CO3
3	Discuss the following		BTL4	Analyze	CO3
	i. LoadString() versus python Methods	8			
	ii. Reading Files Progressively	8			
4	How to deal with Files and folders .Discuss in detail	16	BTL3	Apply	CO3
5	How to List files in Folder	16	BTL3	Apply	CO3
6	Discuss in detail about Asynchronous image downloads.	16	BTL4	Analyze	CO3
7	How to create a database .Discuss how SQL language is used to access the database.How to use MYSQL with processing.	16	BTL5	Evaluate	CO3
8	Describe :	8	BTL3	Apply	CO3
	i. Performance Aspects of Database in interactive Applications				
	ii. Dealing with Large number of Files	8			
9	Differentiate between Text Markup Language and Hyper Text Markup language Explain in detail with examples	16	BTL4	Analyze	CO3
10	Discuss:		BTL4	Analyze	CO3
	i) Is a parser necessary?	8			
	ii)Parsing and manipulating tables from HTML files	8			
11	Describe with an example how the Extensible markup language(XML) is used.	16	BTL4	Analyze	CO3
12	Differentiate JSON and XML with example.	16	BTL4	Analyze	CO3
13	Describe Grammars and Backus Nour Form	16	BTL5	Evaluate	CO3
14	How data is compressed and discuss the various compression system	16	BTL3	Apply	CO3
15	What are the problems that exist with data pulled from web?How to get around these problems	16	BTL6	Create	CO3
16	Describe the following		BTL5	Evaluate	CO3
	i. Parsing data	8			
	ii. Levels of Effort	8			
17	Describe the various Binary File formats	16	BTL5	Evaluate	CO3

### UNIT-4 : INTERACTIVE DATA VISUALIZATION

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts –Geo-mapping – Exporting, Framework – D3.js, Tableau Dashboards.

#### PART A

Q.No	Question	Marks	Level	Competence	Course Outcome
1	Define interactive data visualization?	2	BTL1	Remember	CO4
2	Explain the importance of interactivity in data visualizations.	2	BTL2	Understand	CO4
3	What does drawing with data mean in the context of visualization?	2	BTL1	Remember	CO4
4	How does drawing with data help in conveying complex information?	2	BTL2	Understand	CO4
5	What is the purpose of scales in data visualization?	2	BTL1	Remember	CO4
6	Classify the uses of modern interactive data visualization.	2	BTL2	Understand	CO4
7	What role do axes play in data visualizations?	2	BTL1	Remember	CO4
8	How do axes help in Understand data distributions?	2	BTL2	Understand	CO4
9	What are transitions in data visualization?	2	BTL1	Remember	CO4
10	Explain why motion and updates are important in interactive data visualization.	2	BTL2	Understand	CO4
11	What are common types of interactivity in data visualizations?	2	BTL1	Remember	CO4
12	How does interactivity improve the Understand of data?	2	BTL2	Understand	CO4
13	What is meant by the layout of a data visualization?	2	BTL1	Remember	CO4
14	Why is an effective layout crucial for data visualizations?	2	BTL2	Understand	CO4
15	What is geo-mapping in the context of data visualization?	2	BTL1	Remember	CO4
16	Explain how geo-mapping helps in analyzing regional data.	2	BTL2	Understand	CO4
17	What does exporting mean in data visualization?	2	BTL1	Remember	CO4
18	Why is exporting data visualizations important?	2	BTL2	Understand	CO4
19	What is D3.js in the context of data visualization?	2	BTL1	Remember	CO4
20	How does D3.js help in building customized visualizations?	2	BTL2	Understand	CO4
21	What is a Tableau dashboard?	2	BTL1	Remember	CO4
22	How do Tableau dashboards enhance data analysis?	2	BTL2	Understand	CO4
23	Define Collaboration and sharing.	2	BTL1	Remember	CO4
24	Write the HTML snippet for drawing bar chart.	2	BTL2	Understand	CO4

#### PART B

Q.No	Question	Marks	Level	Competence	Course Outcome
1	Narrate about drawing with data in interactive data visualization.	16	BTL5	Evaluate	CO4
2	(i) Explain in detail about normalization.	8	BTL3	Apply	CO4
	(ii) Explain in detail about scaling and scatter plot.	8			

3	Illustrate Refining plots? Explain in detail.	16	BTL3	Apply	CO4
4	(i) Discuss about Axes.	8	BTL4	Analyze	CO4
	(ii) Discuss in detail about setting axes.	8			
5	(i) Narrate about Ordinal scales.	8	BTL4	Analyze	CO4
	(ii) Explain in detail about Range function.	8			
6	Explain in detail about transition function to visualize the data.	16	BTL3	Apply	CO4
7	Demonstrate on updating Axes in detail.	16	BTL3	Apply	CO4
8	Explain in detail about D3 layouts.	16	BTL3	Apply	CO4
9	Explain in detail about Path and Projection in detail.	16	BTL3	Apply	CO4
10	(i) Define with example about Choropleth.	8	BTL4	Analyze	CO4
	(ii) Explain about acquiring and parsing geodata.	8			
11	Define the updation available along with motion in interactive data visualization.	16	BTL4	Analyze	CO4
12	With relevant examples describe about multiple box plot and trellis plot.	16	BTL4	Analyze	CO4
13	How will you visualize the scales available in interactive data visualization?	16	BTL5	Create	CO4
14	Explain in detail about the Geomapping with interactive data visualization.	16	BTL4	Analyze	CO4
15	Examine the different features available in update and transition functions.	16	BTL4	Analyze	CO4
16	Illustrate the framework of large high dimensional interactive visualization.	16	BTL5	Create	CO4
17	Create data visualization with Tableau.	16	BTL5	Create	CO4

### UNIT-5 : SECURITY IN DATA VISUALIZATION

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems – Creating secured visualization system.

#### PART A

Q.No	Question	Marks	Level	Competence	Course Outcome
1	What is a port scan visualization?	2	BTL1	Remember	CO5
2	How does port scan visualization help in identifying potential security threats?	2	BTL2	Understand	CO5
3	What types of attacks can be detected through port scan visualization?	2	BTL2	Understand	CO5
4	Give the Importance of vulnerability assessments	2	BTL1	Remember	CO5
5	What tools are commonly used for vulnerability assessment in cybersecurity?	2	BTL2	Understand	CO5

6	Explain how vulnerability assessments assist in preventing cyberattacks.	2	BTL2	Understand	CO5
7	What does firewall log visualization involve?	2	BTL1	Remember	CO5
8	Give the steps in firewall visualization process	2	BTL1	Remember	CO5
9	How does visualizing firewall logs help in identifying network security issues?	2	BTL2	Understand	CO5
10	What kind of data is typically found in firewall log visualizations?	2	BTL1	Remember	CO5
11	What is the purpose of intrusion detection log visualization?	2	BTL1	Remember	CO5
12	What is the significance of visualizing intrusion detection system (IDS)	2	BTL2	Understand	CO5
13	How does intrusion detection log visualization assist in identifying potential security breaches?	2	BTL2	Understand	CO5
14	Draw the intrusion detection System within a network structure.	2	BTL2	Understand	CO5
15	What is the role of attacking and defending visualization systems in cybersecurity?	2	BTL1	Remember	CO5
16	Explain how visualizations can be used to simulate and defend against cyberattacks.	2	BTL2	Understand	CO5
17	Give few Attacks that target the visualization system	2	BTL1	Remember	CO5
18	How can attackers use visualization systems for malicious activities?	2	BTL1	Remember	CO5
19	What are the key considerations when creating a secured visualization system?	2	BTL1	Remember	CO5
20	Give few tools for network security visualization	2	BTL2	Understand	CO5
21	What is network security visualization	2	BTL2	Understand	CO5
22	How can secure visualization systems prevent unauthorized data access?	2	BTL2	Understand	CO5
23	What are some common security vulnerabilities in visualization systems?	2	BTL1	Remember	CO5
24	Why is encryption important when creating secured visualization systems?	2	BTL1	Remember	CO5

### PART B

Q.No	Question	Marks	Level	Competence	Course Outcome
1	Explain about port scan security and visualization.	16	BTL3	Apply	CO5
2	Explain about the various Intrusion Detection System Types in detail.	16	BTL3	Apply	CO5
3	Discuss in detail about		BTL4	Analyze	CO5
	(i) Vulnerability assessment	8			
	(ii) Exploitation techniques.	8			
4	Explain in detail about the steps in firewall log visualization process and analysis.	16	BTL3	Apply	CO5
5	Explain in detail about the intrusion detection System (IDS)	16	BTL3	Apply	CO5
6	Draw the intrusion detection System (IDS) within a network structure. Explain the process in the IDS.	16	BTL3	Apply	CO5
7	Discuss in detail about		BTL4	Analyze	CO5
	(i) Host based IDS	8			
	(ii) Cloud based IDS	8			

8	Give a few Attacks that target the visualization system. Explain in detail.	16	BTL3	Apply	CO5
9	Discuss in detail about the visualization for security.	16	BTL3	Apply	CO5
10	Explain the key features of security visualization in detail.	16	BTL4	Analyze	CO5
11	Give a few tools for network security visualization and explain in detail.	16	BTL4	Analyze	CO5
12	Discuss in detail about		BTL4	Analyze	CO5
	(i) Attacking the visualization systems.	8			
	(ii) Defending the visualization systems.	8			
13	Give a few examples of attacking and defending the visualization and explain in detail.	16	BTL5	Evaluate	CO5
14	Explain in detail about		BTL3	Apply	CO5
	(i) Diagram to show the six steps of penetration testing.	8			
	(ii) Two types of detection methods in network intrusion detection system (NIDS)	8			
15	Discuss on the network security visualization methodologies, tools merits and demerits.	16	BTL4	Analyze	CO5
16	Interpret on the vulnerability assessment tools and elaborate on security scanning process.	16	BTL5	Create	CO5
17	(i) Narrate on various attacks in the visualization system.	8	BTL5	Create	CO5
	(ii) Demonstrate on visualization techniques for Intrusion systems.	8	BTL5	Create	CO5

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