Reg. No.															

Question Paper Code	13399

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Eighth Semester

Computer Science and Engineering

20CSEL808 - SCIENTIFIC VISUALIZATION TECHNIQUES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which level of validation ensures that the data is consistent with its intended purpose or context? (a) Task validation (b) Semantic validation (c) Conceptual validation (d) Visual validation	1	K1	CO1
2.	Data abstraction is important because it helps to: (a) Avoid irrelevant data (b) Simplify complex data for easier understanding (c) Increase the volume of data (d) Store data in a secure format	1	K1	CO1
3.	What does contouring represent in data visualization? (a) The flow of vectors (b) The distribution of scalar values in a 2D space (c) The movement of streamlines (d) The height of terrain in 3D	1	K1	CO2
4.	In a color map for scalar visualization, the color gradient is typically used to represent: (a) Direction of flow (b) Magnitude of the scalar field (c) Distance between points (d) Vector field properties	1	K2	CO2
5.	In network visualization, what do edges typically represent? (a) Attributes of nodes (b) Relationships between nodes (c) Values of the network (d) Color schemes	1	K1	CO3
6.	What is a common technique for representing data density in a map? (a) Line charts (b) Histograms (c) Heatmaps (d) Pie charts	1	K1	CO3
7.	Which of the following is a popular data visualization tool? (a) Python (b) Tableau (c) MySQL (d) Java	1	K1	CO4
8.	What is the purpose of a heatmap in data visualization? (a) To represent data density (b) To create 3D models (c) To visualize audio signals (d) To summarize large datasets	1	K1	CO4
9.	Which visualization technique is most effective for analyzing text data? (a) Line Chart (b) Word Cloud (c) Bar Chart (d) Scatter Plot	1	K1	CO5
10.	Which visualization tool is best suited for financial dashboards? (a) Power BI (b) Canva (c) Excel (d) Notepad	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Illustrate data abstraction simplify complex datasets for the user. Provide examples.	2	K1	CO1
12.	What challenges are typically encountered during the process of task abstraction in data visualization?	2	K1	CO1
13.	Explain how contouring works in scientific visualization and how it can be applied to a 2D dataset?	2	K2	CO2
14.	List how do height plots differ from contour plots in terms of visualizing scalar data?	2	K2	CO2

15.	Define geo-spatial data and explain how it is represented visually?	2	K1	CO3
16.	How can position as a visual channel be used to represent data in a scatter plot?	2	K2	CO3
17.	Interpret two popular tools for data visualization.	2	K2	CO4
18.	Compare the difference between histograms and bar charts.	2	K2	CO4
19.	Describe the importance of moving averages in time-series analysis.	2	K2	CO5
20.	List out the significance of hierarchical data visualization.	2	K2	CO5
21.	Describe how network graphs help in fraud detection?	2	K2	CO6
22.	Define management dashboard, and what does it track?	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Discuss the importance of data abstraction in scientific visualization. Provide examples of how complex data is abstracted and its impact on user understanding.	11	K2	CO1
		OR			
	b)	Discuss how the validation process at different levels ensures that scientific visualizations are both accurate and effective. Include a discussion of conceptual, semantic, and visual validation.	11	K2	CO1
24.	a)	Provide a detailed explanation of how vector glyphs are used to represent vector fields. Include an analysis of their advantages and limitations in comparison to other vector visualization techniques.	11	K2	CO2
		OR			
	b)	Illustrate the use of stream objects in scientific visualization. How do they help in visualizing vector fields, and what are the specific use cases where streamlines would be more beneficial than other techniques?	11	K2	CO2
25.	a)	Compute the key techniques used for manipulating views in scientific visualization. Discuss how filtering, zooming, and panning contribute to better data exploration and understanding.	11	K3	CO3
		OR			
	b)	Describe the process of creating hierarchical structures in visual analytics. Explain how trees and networks can be used to represent hierarchical data and how these visualizations help in data interpretation?	11	K3	CO3
26.	a)	Explain the significance of data visualization in scientific research with real-world examples.	11	K3	CO4
		OR			
	b)	Describe the process of creating a data story in Tableau with an example.	11	K3	CO4
27.	a)	Describe multivariate data visualization techniques with appropriate R examples.	11	K3	CO5
		OR			
	b)	Explain the importance of interactive visualization and demonstrate with plotly in R.	11	K3	CO5
28.	a)	Explain the process of creating a financial dashboard using Power BI.	11	K3	CO6
		OR			
	b)	Explain how interactive dashboards improve business intelligence and decision-making.	11	K3	CO6