Reg. No.												

Question Paper Code	13915

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Computer Science and Engineering (AIML)

20AMPW501 - DATA VISUALIZATION TECHNIQUES WITH LABORATORY

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	What is a scatter plot mainly used to show?	1	K1	CO1
	(a) Show frequency distribution (b) Represent hierarchical data			
	(c) Show relationships between two variables (d) Represent time-series data			
2.	How can miss values be handled in data preprocessing?	1	K1	CO1
	(a) Deletion or imputation (b) Randomization (c) Encryption (d) Compression			
3.	Which of the following is not a stage in the visualization process?	1	K1	CO2
	(a) Data collection (b) Data encoding (c) Data hiding (d) Data presentation			
4.	Gibson's Affordance Theory primarily deals with:	1	K1	CO2
	(a) Statistical perception			
	(b) The relationship between visual stimuli and human interaction			
	(c) Symbolic data encoding			
	(d) Visual taxonomy only			
5.	What does the term 'dynamic data visualization' refer to?	1	K1	CO3
	(a) Static data tables (b) Interactive or animated data displays			
	(c) Manual paper charts (d) Numeric data summaries			
6.	Which of the following would be the best method to visualize population density across a city?	1	K1	CO3
	(a) Bar graph (b) Dot map (c) Choropleth map (d) Line graph			
7.	What is the main goal of geospatial data visualization?	1	K1	CO4
	(a) To represent spatial relationships visually (b) To compress data			
	(c) To hide location information (d) To replace numeric data			
8.	which visualization technique a choropleth map represents.	1	K1	CO4
	(a) Point-based (b) Line-based (c) Region-based (d) Network-based			
9.	Define the main purpose of visualization in data science.	1	K1	CO5
	(a) Replace statistical models (b) Enhance interpretability and communication of results			
	(c) Store large datasets (d) Improve hardware performance			
10.	Name the hardware component most critical for real-time visualization.	1	K1	CO6
	(a) GPU (Graphics Processing Unit) (b) Hard disk (c) Printer (d) Network cable			

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

11.	Define data visualization and mention its importance.	2	K1	CO1
12.	Differentiate between structured and unstructured data.	2	K2	CO1
13.	Define semiology of graphical symbols.	2	K1	CO2
14.	Write a short note on Gibson's Affordance Theory.	2	K1	CO2
15.	List two interaction techniques commonly found in dashboards.	2	K1	CO3
16.	Explain why user engagement is important in data visualization.	2	K2	CO3
17.	Differentiate between point-based and line-based visualization techniques.	2	K2	CO4
18.	What is meant by multivariate data? Give one visualization example.	2	K1	CO4
19.	Differentiate between data analysis and data visualization.	2	K2	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13915**

20. How does design thinking enhance the effectiveness of visualizations?	2	K2 CO5
21. State two challenges faced when integrating visualization in multidisciplinary systems.	2	K2 CO6
22. Define system design evaluation in visualization projects.	2	K1 CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23. a) Explain the main steps involved in the data visualization process and how each step helps in understanding data.   *11 K2 CO1*

OR

   b) Describe the importance of preprocessing steps such as normalization, transformation, and handling missing data in producing better data visualizations.   *11 K2 CO1*

24. a) Organize how taxonomies and historical perspectives have influenced the evolution of modern data visualization practices.   *11 K3 CO2*

OR

   b) Construct a detailed explanation of Gibson's Affordance Theory and a model of perceptual processing, showing their role in visualization design and user interaction.   *11 K3 CO2*

25. a) Develop a dashboard specification for a hospital's patient monitoring system. Identify the suitable visualization and interaction techniques you would use and justify each choice.   *11 K3 CO3*

OR

   b) Create and discuss a workflow integrating 3D and dynamic visualizations for presenting medical image datasets. Highlight the potential user interactions at each stage.   *11 K3 CO3*

26. a) Demonstrate the application of point-based, line-based, and region-based methods in visualizing multivariate geospatial datasets, explaining their relevance and use cases.   *11 K2 CO4*

OR

   b) Illustrate the use of graph visualization techniques in displaying relationships and node importance within a social or communication network. Evaluate how visual encoding supports insight into network connectivity and clustering.   *11 K2 CO4*

27. a) Using the principles of cognition, perception, and reasoning, develop a visualization strategy for an interactive real-time system dashboard, and explain how it aids users in understanding data and making informed decisions.   *11 K3 CO5*

OR

   b) Design a visual analytics prototype to represent complex datasets effectively while addressing key visualization problems like clutter, distortion, and overload. Justify how your design decisions enhance clarity and usability."   *11 K3 CO5*

28. a) Examine how variations in data quality parameters such as noise, missing entries, and outliers can distort visualization insights. Analyze potential data preprocessing and analytical approaches to mitigate these effects.   *11 K4 CO6*

OR

   b) Analyze how visualization design principles can be integrated into data science workflows (data preprocessing, analysis, and model interpretation).Discuss the benefits and limitations of such integration with suitable examples.   *11 K4 CO6*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13915**