CMR
INSTITUTE OF
TECHNOLOGY, BENGALURU

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Internal Assesment Test - I

Sub:	DATA VISUALISATION							Code:	MBA BA314
Date:	**05/12/2025**	Duration:	**90min**	Max Marks:	**50**	Sem:	**III**	Branch:	**MBA**

SET- I

		Marks	OBE	
			CO	RBT
	Part A - Answer Any Two Full Questions (2* 20 = 40 marks)			
1 (a)	**1(a) Define data visualization. [03]** Data visualization is the process of representing data and information in graphical or pictorial formats such as charts, graphs, or maps to make patterns, trends, and insights easier to understand.	[03]	CO1	L1
(b)	**1(b) Explain the value of visualization and why it is important. [07]** Visualization adds value by: (1) Making complex data easy to interpret; (2) Identifying trends and patterns quickly; (3) Supporting faster and better decisions; (4) Improving communication of insights; (5) Enhancing memory retention; (6) Revealing hidden relationships; (7) Reducing cognitive load.	[07]	CO1	L2
(c)	**1(c) Describe information overload and how visualization can help reduce it. [10]** Information overload occurs when there is too much data for the human mind to process, causing confusion and poor decision-making. Visualization reduces it by: converting large datasets into simple 0visuals, highlighting key insights, organizing information into patterns, reducing unnecessary details, enabling quick comparisons, and filtering irrelevant information.	[10]	CO1	L2
2 (a)	**2(a) List the steps involved in creating visual representations. [03]** The steps include: data collection, data preprocessing, visual mapping, visualization design, and refinement/evaluation.	[03]	CO2	L1
(b)	**2(b) Explain visual mapping with an example. [07]** Visual mapping is converting data values into visual variables like color, size, or position. Example: Mapping students' scores to a bar chart where the bar height represents the score; higher score → taller bar.	[07]	CO2	L2
(c)	**2(c) Apply task abstraction to analyze a dataset of students' marks. [10]** Task abstraction includes: Discover (find highest/lowest marks), Compare (compare students), Filter (select marks above 75), Summarize (calculate average), Present (use bar/line charts for clarity). This helps understand what users want to do with the data.	[10]	CO3	L3
3 (a)	**3(a) Identify types of visualization systems for one-dimensional and two-dimensional data. [03]** One-dimensional systems: bar charts, line charts, histograms. Two-dimensional systems: scatter plots, heatmaps, geographic maps.	[03]	CO2	L1
(b)	**3(b) Describe the interaction techniques used in visualization. [07]** Interaction techniques include zooming, filtering, highlighting, brushing & linking, panning, tooltips, and sorting to help users explore and analyze data more effectively.	[07]	CO3	L2

(c)	**3(c) Analyze how multi-dimensional data can be visualized using charts or graphs. [10]** Multi-dimensional data can be visualized using scatter plot matrices, heatmaps, bubble charts, radar charts, and 3D plots. These visuals help identify relationships, clusters, patterns, and correlations among many variables.	[10]	CO3	L4
	Part B - Compulsory (01*10=10 marks) – CASE STUDY			
4	Case Study Title:Visualizing Sales Data for a Retail Store A retail store collects monthly sales data for different product categories, including electronics, clothing, and groceries. The store manager wants to understand which categories perform best, identify seasonal trends, and spot underperforming products. The raw data is large and difficult to interpret. To make better business decisions, the manager decides to use data visualization. They are considering bar charts for category-wise sales, line charts to show monthly trends, and heatmaps to compare regional performance. The visualizations should be simple, interactive, and easy to understand. Additionally, the manager wants to ensure that the visualizations are validated, so that insights can be trusted for inventory planning and marketing decisions.			
(a)	**4(a) Suggest two visualization techniques suitable for analyzing sales data. [5] –** Bar charts for comparing category-wise sales and line charts for showing monthly trends and seasonal patterns.	[5]	CO4	L5
(b)	**4(b) Explain how the store can validate that the visualizations accurately communicate insights. [5]** Validation can be done by cross-checking visuals with raw data, using multiple chart types to confirm trends, conducting expert review, ensuring axes and scales are accurate, and performing user testing to verify that viewers correctly interpret the insights.	[5]	CO4	L2

Course Outcomes (COs)		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1:	Understand the key techniques and theory behind data visualization.	1a 1b 1c					1a 1b 1c			
CO2:	Use effectively the various visualization structures (like tables, spatial data, tree and network etc.)		2a 2b 3a					2a 2b 3a		
CO3:	Evaluate information visualization systems and other forms of visual presentation for their effectiveness.				2c 3b 3c		2c 3b 3c			

CO4:	Design and build data visualization systems.				4a 4b			4a 4b			

Cognitive level	KEYWORDS
L1 - Remember	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
L2 - Understand	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
L3 - Apply	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
L4 - Analyze	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
L5 - Evaluate	asses, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
L6 - Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

PO1–*Theoretical Knowledge;* PO2–*Foster Analytical and Critical Thinking Abilities for data-based decision making;*
PO3– ***Develop Value Based Leadership;*** **PO4 –*Ability to Understand and communicate various business aspects to global;***
PO5 – ***Ability to lead themselves and others in the achievement of organizational goals contributing effectively to a team environment;***
PSO1- ***Comprehend Contemporary features of Business Management Science and its administration***
PSO2- ***Analyze and interpret the dynamic situations for making Business Management strategies***
PSO3- ***Handle responsibility with the ethical values for all actions undertaken by them***
PSO4- ***Adapt and focus on achieving the organizational goal and objectives with complete zeal and commitment.***

CI **CCI** **HOD**

Q.No.	Question	CO	Reason for Mapping
1(a)	Define data visualization.	**CO1**	Tests basic conceptual understanding of data visualization theory → aligns with CO1.
1(b)	Explain the value of visualization and why it is important.	**CO1**	Requires understanding of theoretical foundations and benefits of visualization → fits CO1.
1(c)	Describe information overload and how visualization can help reduce it.	**CO1**	Focuses on theoretical explanation of visualization as a solution to cognitive challenges → fits CO1.
2(a)	List the steps involved in creating visual representations.	**CO2**	Steps in creation relate to visualization processes/structures → aligns with CO2 (using structures effectively).
2(b)	Explain visual mapping with an example.	**CO2**	Visual mapping is part of visualization structures (mapping data to marks/channels) → directly matches CO2.
2(c)	Apply task abstraction to analyze a	**CO3**	Task abstraction is an evaluation-oriented process

	simple dataset of students' marks.		to understand what tasks the visualization must support → fits CO3.
3(a)	Identify types of visualization systems for 1D and 2D data.	**CO2**	Recognizing visualization structures for different data types comes under effective use of structures → fits CO2.
3(b)	Describe the interaction techniques used in visualization.	**CO3**	Interaction techniques are evaluated in terms of effectiveness and usability → aligns with CO3.
3(c)	Analyze how multi-dimensional data can be visualized using charts or graphs.	**CO3**	Involves analysis and evaluation of visualization techniques for complex data → fits CO3.
4(a)	Suggest two visualization techniques suitable for analyzing the sales data.	**CO4**	Selecting appropriate techniques and justifying them is part of designing visualization systems → fits CO4.
4(b)	Explain how the store can validate that the visualizations accurately communicate insights.	**CO4**	Validation is a key component of designing and building reliable visualization systems → aligns with CO4.

Q.No.	Keyword Used	Bloom Level	Reason
1(a)	Define	**L1 – Remember**	"Define" is a recall/remembering verb.
1(b)	Explain	**L2 – Understand**	"Explain" requires comprehension and interpretation.
1(c)	Describe	**L2 – Understand**	"Describe" reflects conceptual understanding.
2(a)	List	**L1 – Remember**	"List" is a recall-based action.
2(b)	Explain	**L2 – Understand**	Understanding concept + example explanation.
2(c)	Apply	**L3 – Apply**	"Apply" involves using a concept or method.
3(a)	Identify	**L1 – Remember**	"Identify" requires recall of known items.
3(b)	Describe	**L2 – Understand**	Demonstrates understanding by describing.
3(c)	Analyze	**L4 – Analyze**	"Analyze" requires breaking down and examining.
4(a)	Suggest	**L5 – Evaluate**	Suggesting involves evaluating and choosing among alternatives.
4(b)	Explain	**L2 – Understand**	"Explain" indicates understanding of validation.