Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: MB03092111   **Date: 19-12-2025**

Subject Name: Data Modelling and Visualization

Time: 10:30 AM TO 01:30 PM   **Total Marks: 70**

Instructions
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. USE of SIMPLE calculators AND non-programmable scientific calculators are permitted.

		Marks
Q.1	ALL 7 Questions must be Compulsory.	**14**
(a)	Unstructured Data	
(b)	RFM Segmentation	
(c)	Funnel	
(d)	Slicers	
(e)	Dashboard	
(f)	Data Cleaning	
(g)	Superset	

Q.2 (a) Explain the role of data modelling in business analytics. How do the principles of good modelling practice enhance the reliability and decision-making value of analytical models? Illustrate your answer with suitable examples.   **07**

(b) Assume a business analyst is required to analyze monthly sales data using Excel as a modelling tool.
Explain how a descriptive data model would be designed for this purpose.   **07**

OR

(b) An organization plans to use open-source spreadsheet tools for analytical modelling. Explain how these tools can support the development of a predictive or prescriptive model with necessary steps.   **07**

Q.3 (a) Differentiate between structured and unstructured data in the context of business analytics. How does the nature of data influence the choice of model type?   **07**

(b) Explain the importance of data visualization in business decision-making. How does effective visualization reduce cognitive load and improve managerial insight compared to tabular data?   **07**

OR

(a) Explain the purpose and importance of What-if Analysis in business modelling. Discuss how tools such as Goal Seek, Scenario Manager, and Data Tables support managerial decision-making under uncertainty.   **07**

(b) Differentiate between forecasting and optimization models in business analytics. Explain how regression models and linear programming address different types of business problems, with suitable conceptual illustrations. **07**

Q.4 (a) A firm is planning a new investment project and wants to evaluate its financial feasibility using Excel or open-source spreadsheet tools. Explain how financial models would be conceptually structured and interpreted. **07**

(b) Classify data visualizations based on data type. Explain the suitability of different chart types for each category with justification. **07**

OR

(a) Explain the concept of visual storytelling and visual narratives in analytics. How do chart selection, sequencing, and annotations contribute to building an effective business story? **07**

(b) A retail organization wants to analyze sales trends, customer distribution, and product performance. Explain which types of charts (including advanced visualizations such as waterfall, heatmap, or box plot) you would conceptually select and justify your choices. **07**

Q.5 Aarohan Retail Services Ltd. (ARSL) is a mid-sized omnichannel retail company operating across North India, with both physical stores and a growing online presence. Over the past five years, ARSL has accumulated large volumes of data from multiple sources, including sales transactions (Excel files), customer loyalty databases (SQL), digital marketing platforms (web data), and employee records maintained in spreadsheets.

Despite having data, senior management feels that decisions related to pricing, inventory planning, customer retention, and marketing effectiveness are still largely intuition-driven. The company's leadership has therefore initiated a business analytics and visualization initiative to improve evidence-based decision-making.

The analytics team begins by creating structured data models in Excel and open-source spreadsheet tools to consolidate monthly sales, product categories, regions, costs, and discounts. Using principles of good modelling practice, they ensure transparency, logical flow, and clear assumptions. Initial descriptive models help management understand historical performance across regions and product lines.

To support planning, the team applies What-if Analysis techniques such as Goal Seek and Scenario Analysis to examine how changes in pricing, discounts, or sales volume would affect profitability. Financial feasibility of launching a new private-label product line is evaluated using NPV, IRR, Payback Period, and Break-even Analysis, supplemented by sensitivity analysis to assess risk under changing market conditions.

As competition intensifies, ARSL also explores predictive models. Sales forecasting is conducted using regression-based approaches, while customer segmentation models such as RFM and CLV are conceptually designed to identify high-value customers. The HR department expresses interest in using basic Python with Pandas in the future for employee attrition analysis, though current modelling remains largely spreadsheet-driven.

To communicate insights effectively, the analytics team develops dashboards using Power BI, Tableau Public, and open-source tools such as Apache Superset and Metabase. Following Tufte's and Gestalt principles, they carefully choose appropriate visualizations: line charts for sales trends, bar charts for category comparisons, heatmaps for regional performance, waterfall charts for profit analysis, and box plots to identify outliers in customer spending.

Interactive dashboards are created with KPIs, filters, slicers, and drill-down features, enabling managers to explore data at multiple levels. These dashboards are published and shared across departments to support collaboration. Through visual storytelling, ARSL's leadership gains a clearer understanding of business drivers, customer behavior, and operational inefficiencies.

The initiative marks a shift from static reporting to integrated business modelling and visual analytics, positioning ARSL to compete more effectively in a data-driven retail environment.

(a) In the context of Aarohan Retail Services Ltd., explain how structured and unstructured data from multiple sources can be integrated into a unified analytical framework. Discuss the challenges involved and how spreadsheet tools and BI platforms conceptually address them. **07**

(b) The analytics team uses forecasting, customer segmentation (RFM/CLV), and churn-related models. Explain how these models differ in their business objective, input variables, and decision outcomes, and how management can use them together for strategic planning. **07**

OR

(a) ARSL management wants to ensure that dashboards do not mislead decision-makers. Explain how choosing inappropriate charts or violating visualization principles could result in poor decisions, using examples from sales, profit, or regional performance analysis. **07**

(b) ARSL plans to scale its analytics initiative across departments. Explain the role of publishing, collaboration, access control, and sharing features in any one of following Power BI, Tableau, or open-source BI tools, and how these features support organization-wide decision-making. **07**

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