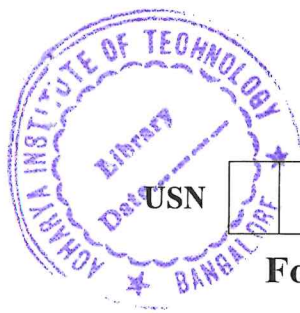




# CBCS SCHEME

MBABA414

## Fourth Semester MBA Degree Examination, June/July 2026 Predictive Analytics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FOUR full questions from Q.No.1 to Q.No.7.  
2. Question No. 8 is compulsory.  
3. M : Marks , L: Bloom's level , C: Course outcomes.*

|     |    |                                                                                                                                                                                                                                                                                                                                                             | M  | L  | C   |
|-----|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|-----|
| Q.1 | a. | Briefly distinguish between Predictive, Descriptive, and Prescriptive Analytics.                                                                                                                                                                                                                                                                            | 3  | L2 | CO1 |
|     | b. | Discuss the impact of Predictive Analytics on effective decision-making in an organisation.                                                                                                                                                                                                                                                                 | 7  | L2 | CO2 |
|     | c. | "Predictive analytics transforms raw data into actionable foresight." Analyse this statement by explaining the transition from data source and collection to execution of the predictive analytics process.                                                                                                                                                 | 10 | L4 | CO2 |
| Q.2 | a. | State three specific business applications of predictive analytics within the BFSI sector.                                                                                                                                                                                                                                                                  | 3  | L2 | CO3 |
|     | b. | Explain the various data collection methods and tools available for gathering structured versus unstructured data.                                                                                                                                                                                                                                          | 7  | L2 | CO3 |
|     | c. | Provide a critical comparative analysis of SAS, SPSS, and Tableau, highlighting how each software uniquely facilitates predictive analytics.                                                                                                                                                                                                                | 10 | L2 | CO3 |
| Q.3 | a. | What is the fundamental difference between structured and unstructured data in a business context?                                                                                                                                                                                                                                                          | 3  | L2 | CO1 |
|     | b. | Illustrate the importance of Data Cleaning and Preparation in predictive analytics.                                                                                                                                                                                                                                                                         | 7  | L2 | CO2 |
|     | c. | Explain the ARIMA Model using a business example.                                                                                                                                                                                                                                                                                                           | 10 | L3 | CO1 |
| Q.4 | a. | Define probability distributions and state their basic role in predictive modelling.                                                                                                                                                                                                                                                                        | 3  | L2 | CO1 |
|     | b. | Elaborate on the fundamental principles of hypothesis testing and its critical importance in establishing a robust statistical foundation for predictive modelling.                                                                                                                                                                                         | 7  | L4 | CO4 |
|     | c. | Suppose a retail bank wants to achieve two distinct goals: first, to automatically group its existing credit card users into distinct spending profiles, and second, to predict if a new, incoming transaction is fraudulent. Which algorithm, K-Means or SVM, should be used for each task? Justify your choice by comparing how both algorithms function. | 10 | L3 | CO4 |

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| Q.5 | a. | What is Hadoop, and Why was it introduced alongside Predictive Analytics?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3  | L2 | CO1 |
|     | b. | Discuss the meaning of Ridge and Lasso regression, highlighting the key differences in their applications and use cases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7  | L3 | CO3 |
|     | c. | Discuss the various cross-validation techniques and explain why this process is a crucial prerequisite for ensuring model reliability before deployment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10 | L2 | CO4 |
| Q.6 | a. | Identify three major ethical issues related to data privacy and security in predictive modeling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3  | L2 | CO1 |
|     | b. | Describe the relationship between bias and variance and explain how they relate to a model being overfitted or underfitted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 7  | L2 | CO2 |
|     | c. | The era of Big Data requires highly robust handling of mechanisms. Compare the capabilities of Hadoop and Spark in managing large datasets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10 | L4 | CO4 |
| Q.7 | a. | Why is data normalisation considered a crucial step during data cleaning and preparation?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3  | L2 | CO1 |
|     | b. | Critically examine the structural differences between Decision Trees and Random Forests.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7  | L4 | CO3 |
|     | c. | With predictive power comes ethical responsibility." Provide a detailed analysis of the ethical issues in predictive analytics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10 | L4 | CO4 |
| Q.8 |    | <p style="text-align: center;"><b>CASE STUDY-Compulsory</b></p> <p style="text-align: center;"><b>Optimising Day-to-Day Operations at FreshMart Regional</b></p> <p>FreshMart Regional, a mid-sized supermarket chain operating fifteen stores across tier-II and tier-III cities, historically relied on the personal experience and intuition of its store managers for daily inventory ordering and staff scheduling. While this intuitive approach functioned adequately during the company's early stages, rapid expansion soon exposed critical inconsistencies in day-to-day operations. The chain began experiencing severe inventory mismanagement, frequently overstocking perishable goods like dairy and vegetables, leading to high spoilage costs while simultaneously running out of high-demand staple items during busy weekends. Furthermore, managers struggled to forecast daily customer footfall, leading to inefficient staffing. Stores were often understaffed during unexpected rush hours, causing long checkout queues, and overstaffed during quiet weekday afternoons, unnecessarily inflating labour costs. The executive team quickly realised that relying strictly on descriptive analytics and historical monthly sales reports was no longer sufficient to manage these daily operational hurdles.</p> |    |    |     |

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|    | <p>Recognising the need to anticipate future trends rather than merely review past performance, FreshMart's analytics team decided to transition the company toward data-driven decision-making by implementing a predictive analytics framework. The team began by gathering comprehensive datasets, including historical point-of-sale (POS) data, local weather forecasts, upcoming regional festival calendars, and historical hourly footfall metrics. Using this information, they developed a robust time-series forecasting model to predict daily product demand and hourly customer traffic for each store location. To ensure this sophisticated model actually promoted the ease of performing day-to-day business operations, the analytics team deliberately avoided overwhelming the store managers with raw data or complex statistical outputs. Instead, they integrated the predictive insights into a highly accessible, user-friendly daily dashboard deployed directly on the managers' store tablets.</p> <p>The introduction of these predictive analytics tools completely transformed the chain's daily operations by automating and optimising previously cumbersome decisions. Store managers no longer had to rely on guesswork to determine how many perishable items to order; the predictive model generated precise daily restocking recommendations based on upcoming weather and local events, which drastically reduced both stock outs and spoilage. Similarly, the dashboard's ability to forecast peak shopping hours for the week ahead enabled managers to effortlessly schedule part-time staff precisely when high footfall was expected, thereby smoothing the checkout process and optimising labour costs. Ultimately, by simplifying the complex, routine decisions of inventory and staff rostering with predictive insights, store managers were freed from back-office number-crunching and could redirect their focus entirely to floor management, operational excellence, and enhancing the overall customer experience.</p> <p><b>Questions:</b></p> |   |    |     |
| a. | Identify the specific data sources FreshMart used to build its predictive model.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5 | L3 | CO4 |
| b. | Why was integrating external data critical for this specific operational use case?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5 | L3 | CO4 |
| c. | Discuss how the implementation of the predictive dashboard fundamentally changed the nature of day-to-day decision-making for the store managers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5 | L3 | CO4 |
| d. | What steps would FreshMart's analytics team need to take if customer buying patterns suddenly shifted due to a new competitor opening nearby?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5 | L3 | CO4 |

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