Graphic Era
HILL UNIVERSITY

End Term (Even) Semester Examination May-June 2025

Roll no. .....

Name of the Program and semester: MBA-IV

Name of the Course: Artificial Intelligence & Machine learning for Business Management

Course Code: MB401 (BA)

Time: 3-hour Maximum Marks: 100

Note:

(i) This question paper contains two Sections-Section A and B

(ii) Both Sections are compulsory

(iii) Answer any two sub questions from a, b & c in each main question of Section A. Each sub question carries 10 marks.

(iv) Section B, consisting of a case study, is compulsory. It is of 20 Marks.

Section A

Q1. (2X10=20 Marks)

a. Explain the role of Machine Learning and Statistics in solving modern business problems. How do they complement each other in practical scenarios? [CO1]

b. Differentiate between Supervised and Unsupervised learning approaches with business-oriented examples. [CO2]

c. Discuss the key steps in the KDD (Knowledge Discovery in Databases) process and explain its relevance in building ML systems. [CO1]

Q2. (2X10=20 Marks)

a. Explain Linear Regression and its usefulness in predicting business outcomes. Also, describe metrics used for model evaluation. [CO2]

b. What is clustering in Machine Learning? Compare K-Means and DBSCAN with respect to their business applications. [CO1]

c. Suppose we have a dataset with the following five data points:

x1 = (3, 2)
x2 = (2, 1)
x3 = (1, 3)
x4 = (5, 4)
x5 = (4, 5)

Perform k-means clustering with k=2 on this dataset, using (2, 1) and (4, 5) as the initial centroids. Draw the resulting cluster assignments and compute the final centroids. [CO3]

Q3. (2X10=20 Marks)

a. What is reinforcement learning? Explain Q-learning with a suitable example of pricing or recommendation systems. [CO2]

b. Explain the concept of association rule mining. How can the Apriori algorithm help in retail or e-commerce businesses? [CO2]

c. Suppose we have a dataset with the following pairwise distances: [CO5]

	A	B	C	D	E
A	0	3	5	7	6
B	3	0	4	6	5
C	5	4	0	4	3
D	7	6	4	0	1
E	6	5	3	1	0

Perform agglomerative clustering with single linkage on this dataset and draw the resulting dendrogram

Q4. (2X10=20 Marks)

a. Explain gradient descent and the backpropagation algorithm. Why are they essential in training deep learning models? [CO3]
b. Design a machine learning workflow to analyze customer behavior and suggest targeted marketing actions. [CO4]
c. Compare and contrast Support Vector Machines and Decision Trees in terms of their applicability to classification problems. [CO3]

Section B

Q5. Case Study [CO5] (20 Marks)

A retail chain wants to implement an AI-driven system to improve pricing strategies, segment customers, forecast sales, and optimize inventory levels across various regions.

Questions:

a. Identify which machine learning techniques (supervised, unsupervised, reinforcement) are best suited for each of the business goals mentioned. Justify your selection.
b. Propose a model architecture or workflow (using regression, clustering, or neural networks) to solve these problems effectively.
c. Discuss how optimization and deep learning can enhance prediction accuracy and operational efficiency.