123520

62473

Reg. No. | | | | | | | | | |

III Semester M.C.A. Degree Examination April/May - 2026

COMPUTER SCIENCE

Machine Learning (Elective)

(Non NEP Scheme)

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Answer any **Five** questions from Part - A.

Answer any **Four** questions from Part - B.

PART - A

Answer any Five questions. Each question carries 6 marks. **(5×6=30)**

1. Explain principal component analysis for dimension reduction.

2. Define Machine Learning. Briefly explain different types of learning methods.

3. Explain Hypothesis, Hypothesis space and version space with an example.

4. Describe back propagation algorithm.

5. Summarize the application of genetic Algorithm decision tree.

6. Discuss the difference between hierarchical and Non- hierarchical Clustering.

7. With an example explain FP growth algorithm.

8. Explain basic elements of Hidden Markov Model (HMM). List any two applications of HMM.

[P.T.O.

PART - B

Answer any Four questions. Each question carries 10 marks. **(4×10=40)**

9. A machine learning model is developed to predict whether a student will pass or fail in an MCA semester examination. After testing the model on 200 students, the following results were obtained: 90 students who actually passed were predicted as Pass, 20 students who actually passed were predicted as Fail, 30 students who actually failed were predicted as Pass, 60 students who actually failed were predicted as Fail. Based on the above information, Construct the Confusion Matrix . Calculate the following performance measures: Accuracy, Precision, Recall (Sensitivity), Specificity, Fl-Score. Also comment on the performance of the model based on the obtained results.

10. The following distance matrix represents the pairwise distances among five objects a, b, c, d, and e.

	a	*b*	*c*	*d*	*e*
a	0	9	3	6	11
b	9	0	7	5	10
c	3	7	0	9	2
d	6	5	9	0	8
e	11	10	2	8	0

Using the Complete Linkage Hierarchical Clustering (Agglomerative Method): Show the step-by-step clustering process, Update the proximity matrix at each stage, Construct the dendrogram for the given data, also indicate the order in which clusters are merged.

11. a) Using the given dataset, apply the ID3 algorithm and determine the best attribute for the first split while constructing the decision tree. **(6)**

Major	**Experience**	**Tie**	**Hired**
CS	Programming	Pretty	No
CS	Programming	Pretty	No
CS	Management	Pretty	Yes
CS	Management	Ugly	Yes
Business	Programming	Pretty	Yes
Business	Programming	Ugly	Yes
Business	Management	Pretty	No
Business	Management	Pretty	No

b) Explain the Expectation-Maximization (EM) Algorithm used in Machine Learning.**(4)**

12. a) Explain how Apriori algorithm works. (5)

b) Using K-means clustering, cluster the following data into two groups. Assume cluster centres are m1=2 and m2 =4. The distance function is used is Euclidean distance {2, 4, 10, 12, 3, 20, 30, 11, 25}. (5)

13. Explain Find S algorithm with suitable example also give its advantages and disadvantages.

14. a) Explain the steps involved in the Genetic Algorithm for determining the best hypothesis(Optimal solution) (7)

b) Discuss the applications of Genetic Algorithms in various problem domains (3)