Name:_____
Roll No:_____

MAR ATHANASIUS COLLEGE OF ENGINEERING KOTHAMANGALAM - 686666

(Govt. Aided Autonomous Institution)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B. TECH SECOND SERIES EXAMINATION, OCTOBER 2026
(S7 ECE A &B) ECT463 MACHINE LEARNING

Max. Marks: 40 Duration: 1.5 Hours

PART A

Answer all questions. Each question carries 3 marks.

1	A binary classifier gives incorrect predictions even though the learning rate is increased. Explain whether increasing the learning rate alone can solve the problem.	CO3
2	A perceptron is able to classify AND-gate inputs but fails for XOR-gate inputs. Explain this using the concept of linear separability.	CO3
3	Examine how the choice proximity measure impacts the grouping of unlabeled data.	CO4
4	Examine in which condition Unsupervised is preferred with help of an example.	CO4

PART B

Answer all questions. Each question carries 14 marks.

5. a)	A smart fire alarm node processes environmental sensor readings : temperature (x_1=0.4), smoke density (x2=0.6) and humidity (x3=0.7) weighted by relevance [0.2, 0.3, -0.4] with a sensor bias of 0.30. i) Calculate the neuron's response in a perceptron model using a step activation function to determine if a binary trigger signal (0 or 1) is fired. ii) Explain briefly the decision process	CO3 7 marks
b)	Explain Gradient Descent Algorithm.	CO3 7 marks
6. a)	Explain the different criterion functions used for clustering.	CO4 6 marks
b)	A smart city planner is analyzing data from traffic sensor networks across a metropolis to identify distinct traffic congestion zones. Compare the application of agglomerative and divisive hierarchical clustering for this task. Explain the clustering process, the direction in which clusters are formed, and the advantages and limitations of each approach.	CO4 8 marks