



SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech. Computer Science and Engineering (ALL Branches)
Course Code and Course Name : BCSE209L - Machine Learning
Faculty Name(s) : SUDHA.S, SARAVANAKUMAR K, VISWANATHAN P, SUDHAKARAPANDIAN R
Class Number(s) : 2085, 2087, 2098, 2173
Date of Examination : 17-08-2025
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Course Outcomes:
CO1: Understand, visualize, analyze and preprocess the data from a real-time source.
CO2: Apply appropriate algorithm to the data.

Q. No	Question	M																								
1.	Explain the concept of a) Probably Approximately Correct (PAC) learning with an example. Discuss the importance of complexity in PAC learning.	5																								
	b) Define Version Spaces in the context of concept learning. With a suitable example, illustrate how the Candidate Elimination Algorithm can be used to find the target concept.	5																								
2.	You are given the following dataset (5 observations) with two predictors X1, X2, and response Y: <table><tr><th>S.No</th><th>X1</th><th>X2</th><th>Y</th></tr><tr><td>1</td><td>1.0</td><td>2.0</td><td>14.0</td></tr><tr><td>2</td><td>2.0</td><td>0.5</td><td>10.0</td></tr><tr><td>3</td><td>3.0</td><td>2.5</td><td>18.0</td></tr><tr><td>4</td><td>4.0</td><td>4.0</td><td>24.0</td></tr><tr><td>5</td><td>5.0</td><td>3.5</td><td>27.0</td></tr></table> Fit the multiple linear regression model and predict the value of Y when X1=6.0 and X2=5.0	S.No	X1	X2	Y	1	1.0	2.0	14.0	2	2.0	0.5	10.0	3	3.0	2.5	18.0	4	4.0	4.0	24.0	5	5.0	3.5	27.0	10
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3. The following dataset have been collected last year. Three nominal attributes: Weather $\in$ {Sunny, Overcast, Rain}, Humidity $\in$ {High, Normal}, Wind $\in$ {Weak, Strong}. Target class Play $\in$ {Yes, No}.

S. No	Weather	Humidity	Wind	Play
1	Sunny	High	Weak	No
2	Sunny	High	Strong	No
3	Overcast	High	Weak	Yes
4	Rain	Normal	Weak	Yes
5	Rain	High	Strong	No
6	Sunny	Normal	Weak	Yes
7	Overcast	Normal	Strong	Yes

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Use ID3 Algorithm and draw the decision tree.

4. Use appropriate classifier to predict the test data for the following Attributes (X1 and X2) and Target group (Class)

Observation	X1	X2	Class
1	1.0	2.0	A
2	1.5	1.8	A
3	2.0	2.2	A
4	3.0	3.0	A
5	3.5	2.5	B
6	4.0	3.5	B
7	3.8	4.0	B
8	5.0	5.0	B
9	1.0	3.0	A
10	4.5	2.0	B

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Classify the new point (X1=3.2, X2=2.7) using Euclidean distance with k=5. Use simple majority vote, if there is a tie, break it by choosing the class of the nearest neighbour among the tied classes. Show all distance calculations and the chosen neighbours.

5. The Perceptron model can classify data points if they are linearly separable in the input space.
For the binary logic functions AND, OR, and XOR, write down their respective truth tables. Using suitable sketches or diagrams, explain which of these functions are linearly separable and which are not. Justify why the perceptron can or cannot learn each of these logic functions.

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