PVP 23

Code: 23AM3401

II B.Tech - II Semester – Regular Examinations - MAY 2025

MACHINE LEARNING
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define Machine Learning.	L2	CO1
1.b)	List any four applications of Machine Learning.	L2	CO1
1.c)	Write the different metrics for evaluating classifier performance.	L2	CO1
1.d)	Write the applications of Non-linear Regression applications.	L2	CO1
1.e)	Define Information gain.	L2	CO1
1.f)	What is conditional Independence?	L2	CO1
1.g)	Explain the concept of a Perceptron with a neat diagram.	L2	CO1
1.h)	What do you mean by Gradient Descent?	L2	CO1
1.i)	Write the types of Linkage criteria.	L2	CO1
1.j)	Write the different metrics used in clustering.	L2	CO1

PART – B

<table>
<tr><th></th><th></th><th></th><th>BL</th><th>CO</th><th>Max. Marks</th></tr>
<tr><td colspan="6">UNIT-I</td></tr>
<tr><td rowspan="2">2</td><td>a)</td><td>Compare and contrast supervised, unsupervised, and reinforcement learning.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td>b)</td><td>What are the major challenges in training machine learning models? Explain with examples.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>3</td><td colspan="2">Explain the following with an example
i) Accuracy ii) Precision iii) MSE (Mean Squared Error) iv) Overfitting v) Recall</td><td>L2</td><td>CO1</td><td>10 M</td></tr>
<tr><td colspan="6">UNIT-II</td></tr>
<tr><td>4</td><td colspan="2">Train a Linear Regression model on the given data
<table>
<tr><th>Advertising Budget (Rs)</th><th>Sales Revenue(Rs)</th></tr>
<tr><td>1000</td><td>5000</td></tr>
<tr><td>2000</td><td>12000</td></tr>
<tr><td>3000</td><td>20000</td></tr>
<tr><td>4000</td><td>30000</td></tr>
<tr><td>5000</td><td>50000</td></tr>
</table></td><td>L3</td><td>CO2</td><td>10 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">5</td><td>a)</td><td>What is Logistic Regression? Explain with a real-world application.</td><td>L2</td><td>CO2</td><td>5 M</td></tr>
<tr><td>b)</td><td>Differentiate between Linear Regression and Non-Linear Regression with examples.</td><td>L4</td><td>CO2</td><td>5 M</td></tr>
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<tr><td colspan="6">UNIT-III</td></tr>
<tr><td rowspan="2">6</td><td>a)</td><td>Compare and contrast Gini Index and Information Gain as splitting criteria in Decision Trees. Which one is better and why?</td><td>L4</td><td>CO4</td><td>5 M</td></tr>
<tr><td>b)</td><td>Explain the working of the K-Nearest Neighbors (KNN) algorithm with a suitable example. How does it classify new data points?</td><td>L2</td><td>CO2</td><td>5 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">7</td><td>a)</td><td>What is Entropy and Information Gain in Decision Trees? Explain how they are used for feature selection with an example.</td><td>L2</td><td>CO2</td><td>5 M</td></tr>
<tr><td>b)</td><td>Explain the Bayesian Classification approach and its importance in machine learning. How does it differ from other classification techniques?</td><td>L2</td><td>CO2</td><td>5 M</td></tr>
<tr><td colspan="6">UNIT-IV</td></tr>
<tr><td>8</td><td></td><td>
<table>
<tr><th>Input(x1,x2)</th><th>Target Output(Y)</th></tr>
<tr><td>(0,0)</td><td>0</td></tr>
<tr><td>(0,1)</td><td>0</td></tr>
<tr><td>(1,0)</td><td>0</td></tr>
<tr><td>(1,1)</td><td>1</td></tr>
</table>
i) Initialize weights as W1 = 0.5, W2 = -0.4, and bias b = 0.2. Use a learning rate of 0.1 and update the weights using the Perceptron Learning Rule for one iteration.
</td><td>L4</td><td>CO4</td><td>10 M</td></tr>
</table>

	ii) Determine whether the given dataset can be linearly separated using a perceptron.				
OR					
9	a)	Explain the architecture of an Artificial Neural Network (ANN) with a neat diagram.	L2	CO2	5 M
	b)	Explain about Support Vector Machine (SVM).	L2	CO2	5 M
UNIT-V					
10	a)	Explain K-Medoids algorithm with an example.	L2	CO3	5 M
	b)	List out different applications of Clustering.	L2	CO1	5 M
OR					
11	a)	Describe the step-by-step process of Agglomerative Clustering.	L2	CO3	5 M
	b)	Explain different Linkage criteria.	L2	CO1	5 M