

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.Tech.
BRANCH: AI

SEMESTER : V
SESSION : MO/2025

SUBJECT: AI363 INTRODUCTION TO MACHINE LEARNING

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

Q.1(a)	Define Machine Learning. Explain its significance with real-life examples.	[2]	CO 1	BL 1,2												
Q.1(b)	Differentiate between Supervised , Semi-supervised , and Unsupervised learning with suitable examples.	[3]	CO 1	BL 2,4												
Q.2(a)	Explain the concept of Eigenvalues and Eigenvectors . Show step-by-step calculation of eigenvalues for the matrix $\begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$	[2]	CO 2	BL 2,3												
Q.2(b)	Describe the working of Principal Component Analysis (PCA) . How does PCA help in dimensionality reduction?	[3]	CO 2	BL 2,3												
Q.3(a)	In linear regression, how is prediction accuracy measured ?	[2]	CO 1	BL 1												
Q.3(b)	Apply the technique of linear regression (closed form solution) on the following data:	[3]	CO 3	BL 3												
	<table border="1"><tbody><tr><td>X</td><td>1</td><td>2</td><td>34</td><td>4</td><td>5</td></tr><tr><td>y</td><td>12</td><td>18</td><td>22</td><td>28</td><td>35</td></tr></tbody></table>	X	1	2	34	4	5	y	12	18	22	28	35			
X	1	2	34	4	5											
y	12	18	22	28	35											
	Compute the value of y for x = 8.															
Q.4(a)	Discuss the Bias-Variance Trade-off in supervised learning. Illustrate with a suitable diagram.	[2]	CO 2	BL 2,4												
Q.4(b)	Explain Regularization in linear regression. How does it help to reduce overfitting?	[3]	CO 2	BL 2,5												
Q.5(a)	Explain Logistic Regression as a classification algorithm. Derive its cost function.	[2]	CO 3	BL 2,4												
Q.5(b)	State important issues in classification problems. Suggest possible solutions.	[3]	CO 3	BL 4												

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