VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2024-2025

SLOT: A2 + TA2

Programme Name & Branch	**: B.Tech (Common to all)**
Course Code and Course Name	**: BCSE209L Machine Learning**
Faculty Name(s)	**: Sendhil Kumar KS**
Class Number(s)	**: VL2024250501811**
Date of Examination	**: 16-03-2025**
Exam Duration	**: 90 minutes**

Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q. No	Question	M	CO	BL
1.	A company collects employee data based on two attributes: years of experience and number of completed projects to classify whether an employee is High-performing or Low-performing. Consider the following training samples: Years of Experience (X1) | Completed Projects (X2) | Classification (Y) 5 | 12 | High-performing 3 | 8 | Low-performing 2 | 6 | Low-performing 6 | 15 | High-performing Now, a new employee joins the company with X1 = 4 years of experience and X2 = 10 completed projects. Assume K=3, Using the K-Nearest Neighbours (KNN) algorithm, determine whether the new employee is likely to be classified as High-performing or Low-performing based on the given data.	10	CO 2	BL3
2	Consider a set of 2-dimensional training data points (x1, x2) belonging to two classes A and B respectively as shown below. Class A contains positively labelled data poiints and Class B contains Negatively labelled data points. Design a linear SVM to classify them. Class A: (4,2), (4,-2), (7,2), (7,-2) Class B: (2,0), (1,1), (1,-1), (-1,0) • Determine if the given data points are linearly separable. • If they are linearly separable, find the equation of the optimal separating hyperplane using the Support Vector Machine (SVM) approach. • Using the identified hyperplane, classify the new point **(5, 0)** belongs to Class A or Class B.	10	CO2	BL3

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3	Cluster the following eight points into three clusters using the k-means algorithm with the Manhattan distance function: A1(3,9),A2(2,6),A3(7,3),A4(5,7),A5(8,6),A6(6,3),A7(1,1),A8(4,8) Initial cluster centers: C1=(3,9), C2=(5,7), C3=(1,1) Find the cluster centers after two iterations.	10	CO3	BL5
4	Construct a Self-Organizing Map (SOM) for the given four input vectors of five features each: X1=[0.7,0.1,0.5,0.8,0.2], X2=[0.5,0.3,0.2,0.6,0.4], X3=[0.3,0.4,0.7,0.5,0.6], X4=[0.2,0.5,0.9,0.4,0.7] Number of clusters to be formed: 2 and the Learning rate: 0.6 Initial weight vectors: W_1 = [0.8, 0.5, 0.3, 0.4, 0.6] , W_2 = [0.7, 0.6, 0.4, 0.3, 0.5] Repeat the algorithm for one iteration.	10	CO3	BL5
5	Given the following dataset, compute the first principal component using the PCA technique.	10	CO3	BL3

Feature	Value 1	Value 2	Value 3	Value 4
A	3	4	6	7
B	5	7	9	12

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