REG.NO.:

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

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

SLOT: G1+TG1

Programme Name & Branch	**: M.Tech CSE Integrated**
Course Code and Course Name	**: MDI3006 , ADVANCED DATA ANALYTICS**
Faculty Name(s)	**: Dr.Chellatamilan T, Dr.EBENEZER JULIET S**
Class Number(s)	**: VL2024250502876, VL2024250502880**
Date of Examination	**: 02-02-2025**
Exam Duration	**: 90 minutes**

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

CO1 - Understand the algorithms and functioning of advanced techniques and concepts such as deep learning, distance metric learning, and domain adaptation.

CO2 - Understand the advantages and limitations of the algorithms and their potential applications.

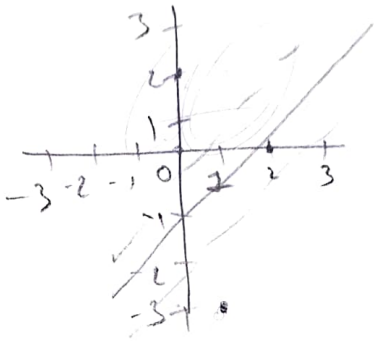
Q. No	Question	M	CO	BL
1.	*Explain briefly the influence of kernel trick and high lights the property of the kernel functions used to transform the data into a higher dimensional space where it becomes linearly separable. Illustrate how this transformation works with suitable example and plots.*	10	1	3
2.	Consider a simple 2D dataset with labelled points and apply Multiple Kernel Learning (MKL) to determine the equation of the hyperplane Point A: (1, 2), Label: +1 Point B: (2, 3), Label: +1 Point C: (3, 3), Label: -1 Point D: (4, 5), Label: -1 Create a combined kernel with equal weight as in the order given below and then find the value of the decision function f(x). Linear Kernel Radial Basis Function (RBF) Kernel Let's assume some hypothetical values for $\alpha$and b. compute $f(x)$ for a new test point (4,5) $$f(x) = \sum_{i=1}^{n} \alpha_i y_i K(x, x_i) + b$$	10	1	4
3.	Let's assume we have a hyper plane defined by: $w \cdot x+b=0$ whereas the weight vector w=[1,-1] and considering the classification decision rule of SVM as Decision=sign($w \cdot x+b$). Classify each of the data points given below and identify which of the data points are correctly classified.	5 5	1	4

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

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

SLOT: G1+TG1

Point	X1	X2	Label
P1	0	2	+1
P2	1	2	-1
P3	2	2	-1
P4	1	3	-1
P5	1	-3	+1



Consider a new data point P6 (3,2) and identify the class label of this data point, also visualize them in a plot

4	Explain the General setting of the PAC Learning model and illustrate your explanation with suitable diagram showing the relationship between the target function, hypothesis class and the samples	10	1	3
5	Suppose we have a binary classification problem where we want to predict whether a student passes (1) or fails (0) based on their study hours. We have the following dataset:	10	2	5

Study Hours	Pass/Fail
1	0
2	0
3	0
4	1
5	1
6	1
7	1

Fit a simple decision stump (a one-level decision tree) to the residuals. Illustrates the iterative nature of Gradient Boosting, where each step aims to correct the errors of the previous model, eventually leading to a strong predictive model.

****