Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110
(An Autonomous Institution, Affiliated to Anna University, Chennai)
Department of Computer Science and Engineering
Continuous Assessment Test – II
Question Paper

Degree & Branch	B.E. & CSE				Semester	VI
Subject Code & Name	UCS1603 & INTRODUCTION TO MACHINE LEARNING				Regulation:	2018
Academic Year	2021-2022	Batch	2019-2023	Date	04.05.2022	FN
Time: 90 minutes (8.30-10.00 AM)	Answer All Questions				Maximum: 50 Marks	

Part – A (6×2 = 12 Marks)

<K1>	1. List any two applications of supervised learning using backpropagation algorithm.	<CO2>
<K1>	2. How the error is calculated from the misclassified samples in SVM?	<CO2>
<K3>	3. Assume X = [−3, −2, 0, 1, 3]. If X maps to higher dimension using quadratic function, then the X is ……………………	<CO2>
<K1>	4. What is the need of ensemble algorithm?	<CO3>
<K3>	5. Mr.Paul intends to buy a house in Chennai and he wants to analyze the price of the house. Can you help him by using suitable ML algorithm to predict the price? Justify your choice of the algorithm.	<CO2>
<K3>	6. Find the information gain of the following data set S={s1, s2, s3, s4} where s1=false, s2=true, s3=false, s4=true F={f1, f2} where f1={s1, s2} and f2={s3, s4} using appropriate formulas.	<CO3>

Part – B (3×6 = 18 Marks)

<K3>	7. Given a set of points as shown below. The data points 3 and 7 belong to class 1 and data point 12 belong to class 2. 3 7 9 10 11 12 Make use of SVM concept to find the value "x" at which the decision line crosses. And also find the values of "w" and "b" in the objective function.	<CO2>
<K3>	8. Solve the given problem using Linear Regression and find the Sum of Squared error with procedure and equations. X = [1, 2, 3, 4, 5] Y = [1, 3, 2, 3, 5]	<CO2>
<K2>	9. Compare the ensemble learning algorithms: Random forest versus Boosting.	<CO3>

Part – C (2×10 = 20 Marks)

<K2>	10. Explain the structure of MLP network with backpropagation algorithm by assuming the layers as I, H, O with weights as W_{ij} and V_{jk} between the layers.	<CO2>

(OR)

<K2>	11. Explain the objective functions of SVM (maximization, minimization) in primal form and derive the dual formulation using KKT conditions and Lagrangian multiplier for both objective functions.	<CO2>

<K3>

12. Construct the decision tree for the dataset given in the below table. Use the impurity functions: Entropy and Information gain to draw the first level tree representation.

Day	Outlook	Temp	Humidity	Wind	Play
1	Overcast	Hot	High	Weak	No
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	Yes
5	Rain	Cold	Normal	Weak	Yes
6	Rain	Cold	Normal	Strong	No
7	Overcast	Cold	Normal	Strong	Yes
8	Sunny	Mild	High	Weak	No
9	Sunny	Cold	Normal	Weak	Yes
10	Rain	Mild	Normal	Weak	Yes
11	Sunny	Mild	Normal	Strong	Yes
12	Overcast	Mild	High	Strong	Yes
13	Overcast	Hot	Normal	Weak	Yes
14	Rain	Mild	High	Strong	No

<CO3>

(OR)

<K3>

13. Construct the decision tree for the dataset given in the below table. Use the impurity function: Gini Index to draw the final decision tree and its corresponding rules in First Order Logic form.

Past Trend	Open Interest	Trading Volume	Return
Positive	Low	High	Up
Negative	High	Low	Down
Positive	Low	High	Up
Positive	High	High	Up
Negative	Low	High	Down
Positive	Low	Low	Down
Negative	High	High	Down
Negative	Low	High	Down
Positive	Low	Low	Down
Positive	High	High	Up

<CO3>