



**Department of CSE Data Science**

**UNIT TEST – I**

Academic Year 2023-24

Class: TEDS

Semester: VI

Subject: CSC604-Machine Learning

Date: 20/02/2024

Time: 2:00 to 3:30pm

Max marks: 40

Note the following instructions

1. All questions are mandatory (Q.1, Q.2, Q.3)
2. Draw neat diagrams wherever necessary.
3. Write everything in Black ink (no pencil) only.
4. Assume data, if missing, with justification.

Q.N	Questions	MARKS	CO	Blooms Taxonomy Level	PO2
<b>Q.1</b>	<b>Attempt any two</b>				
a)	Given $X = [-2, 6, 1]$ , calculate the $L_1$ , $L_2$ , $\infty$ norm.	[5]	CO2	L3	PO1, PO12
b)	Show that $V_c(C)$ is an inner product space with inner product define on $\alpha = (a_1, a_2, \dots, a_n)$ , $\beta = (b_1, b_2, \dots, b_n) \in V_n(C)$ by $(\alpha, \beta) = a_1b_1 + a_2b_2 + \dots + a_nb_n$	[5]	CO2	L3	PO1, PO12
c)	Find eigen values for the following matrix $A = \begin{bmatrix} 3 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 1 & 3 \end{bmatrix}$	[5]	CO2	L3	PO1, PO12
d)	$A = \begin{bmatrix} 3 & -4 & 0 \\ -4 & 1 & -4 \\ 0 & -4 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 6 & 2 & -6 \\ 6 & 5 & -8 \\ -8 & -7 & 5 \end{bmatrix}$ <p>Check if the symmetric matrices A, B are positive definite.</p>	[5]	CO2	L3	PO1, PO12

Q.2	Attempt any two																							
a)	Fit the straight-line curve with help of least square method for the following and predict no of T-shirt sold for the price \$8. <table><tr><td>Price of T-shirts in dollars(X)</td><td>2</td><td>3</td><td>5</td><td>7</td><td>9</td></tr><tr><td>No. of T-shirt sold (Y)</td><td>6</td><td>8</td><td>9</td><td>12</td><td>17</td></tr></table>					Price of T-shirts in dollars(X)	2	3	5	7	9	No. of T-shirt sold (Y)	6	8	9	12	17	[10]	CO3	L3	PO1, PO12			
Price of T-shirts in dollars(X)	2	3	5	7	9																			
No. of T-shirt sold (Y)	6	8	9	12	17																			
b)	Identify hyperplane for the given data points using Support Vector Machine Positively labelled data points (4,1),(4,-1) and (6,0) Negatively labelled data points(1,0), (0,1) and (0,-1)					[10]	CO3	L3	PO1, PO12															
c)	Evaluate the following dataset to fit a multiple linear regression model <table><tr><td>X1 (product 1 Sales)</td><td>X2 (Product 2 Sales)</td><td>Y (Weekly Sales)</td></tr><tr><td>1</td><td>4</td><td>1</td></tr><tr><td>2</td><td>5</td><td>6</td></tr><tr><td>3</td><td>8</td><td>8</td></tr><tr><td>4</td><td>2</td><td>12</td></tr></table>					X1 (product 1 Sales)	X2 (Product 2 Sales)	Y (Weekly Sales)	1	4	1	2	5	6	3	8	8	4	2	12	[10]	CO3	L3	PO1, PO12
X1 (product 1 Sales)	X2 (Product 2 Sales)	Y (Weekly Sales)																						
1	4	1																						
2	5	6																						
3	8	8																						
4	2	12																						
Q.3	Attempt any one																							
a)	What are the steps in designing a machine learning problem? Explain with example.					[10]	CO1	L2																
b)	A machine learning model is trained to predict tumor in patients. The test dataset consists of 100 people. <div><div>ACTUAL</div><div><table><tr><td></td><td>Negative</td><td>Positive</td></tr><tr><td rowspan="2">PREDICTION</td><td>Negative</td><td>60</td><td>8</td></tr><tr><td>Positive</td><td>22</td><td>10</td></tr></table></div></div> Find Accuracy, Precision, Recall, F1 Score, Specificity for the given Confusion Matrix.						Negative	Positive	PREDICTION	Negative	60	8	Positive	22	10	[10]	CO1	L2						
	Negative	Positive																						
PREDICTION	Negative	60	8																					
	Positive	22	10																					