

Code: 20IT3601

**III B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2024**

**MACHINE LEARNING TECHNIQUES
(INFORMATION TECHNOLOGY)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Define the following machine learning techniques with examples. (i) classification, (ii) regression (iii) clustering	L2	CO1	7 M
	b)	Differentiate between Supervised, Unsupervised and Reinforcement learning by use of suitable examples.	L3	CO2	7 M
OR					
2	a)	Differentiate the following machine learning classification techniques with examples. (i) Discrimination (ii) Prediction	L2	CO1	4 M
	b)	Credit card fraud detection problem: This problem includes modeling past credit card transactions with the knowledge of the ones that turned out to be a fraud. This model is then used to identify whether a new	L3	CO2	10 M

		<p>transaction is fraudulent or not. Our aim here is to detect 100% of the fraudulent transactions while minimizing the incorrect fraud classifications.</p> <p>Model this problem into regression technique and then present its corresponding functions.</p>			
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UNIT-II

3	a)	Explain the multiple linear regression objective function using method of least squares error.	L3	CO2	7 M
	b)	<p>Define the following performance functions and then illustrate their specific characteristics.</p> <p>(i) <i>R-Square</i>,</p> <p>(ii) <i>Mean Square Error (MSE)</i></p> <p>(iii) <i>Root Mean Square Error (RMSE)</i></p> <p>(iv) <i>Mean Absolute Error (MAE)</i></p>	L3	CO2	7 M

OR

4	a)	<p>Find the equation of the regression line from the given data where price, (X- in rupees) and Y as amount demanded.</p> <table border="1" style="margin-left: 20px;"> <tr> <td>Price (Rs)</td> <td>10</td> <td>12</td> <td>13</td> <td>12</td> <td>16</td> <td>13</td> </tr> <tr> <td>Amount demanded</td> <td>40</td> <td>38</td> <td>43</td> <td>45</td> <td>37</td> <td>43</td> </tr> </table>	Price (Rs)	10	12	13	12	16	13	Amount demanded	40	38	43	45	37	43	L3	CO2	8 M
	Price (Rs)	10	12	13	12	16	13												
Amount demanded	40	38	43	45	37	43													
b)	Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations: $2Y - X - 50 = 0$, $3Y - 2X - 10 = 0$.	L3	CO2	6 M															

UNIT-III					
5	a)	Write and explain the expectation maximization algorithm.	L2	CO1	7 M
	b)	Illustrate the similarity and differences between bagging and boosting model combination schemes.	L3	CO3	7 M
OR					
6	a)	Explain the complete-link clustering technique.	L2	CO1	4 M
	b)	Cluster the following eight points (with (x, y) representing locations) into three clusters: A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9) Initial cluster centers are: A1(2, 10), A4(5, 8) and A7(1, 2). The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as $P(a, b) = x2 - x1 + y2 - y1 $ Use K-Means Algorithm to find the three cluster centers after the second iteration.	L3	CO3	10 M
UNIT-IV					
7	a)	Explain <i>multi-layer perceptron</i> network with neat diagram and then write its objective function.	L3	CO3	8 M
	b)	Define <i>dimensionality reduction</i> . Design and explain how <i>autoassociator</i> network will work for dimensionality reduction.	L3	CO3	6 M
OR					

8	a)	Write <i>backpropagation algorithm</i> for training a multilayer perceptron for regression with K outputs.	L3	CO3	7 M
	b)	Explain how the multilayer perceptron that solves the XOR problem with an example. The hidden units and the output have the threshold activation function with small threshold value.	L3	CO3	7 M
UNIT-V					
9	a)	Differentiate <i>action</i> and <i>policy</i> in reinforcement learning.	L4	CO4	7 M
	b)	Interpret the steps involved in a typical reinforcement learning algorithm.	L4	CO4	7 M
OR					
10	a)	Write and explain the <i>on-policy version of Q learning</i> .	L4	CO4	7 M
	b)	Define the temporal difference learning. What is the difference between a deterministic and stochastic policy?	L4	CO4	7 M