

Nov – Dec 2023

(B.Tech ) Program: Computer Engineering Scheme-II

Examination: LY Semester:VII

Course Code:CEC701 and Course Name: Machine Learning

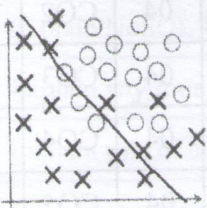
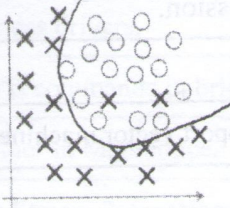
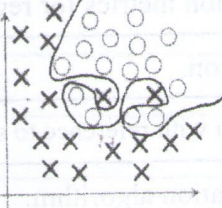
Date of Exam: 04/12/2023

Duration: 2.5 Hours

Max. Marks: 60

**Instructions:**

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level										
<b>Q.1</b>	<b>Solve any six questions out of eight:</b>	<b>12</b>												
i)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Fig.A</p>  </div> <div style="text-align: center;"> <p>Fig.B</p>  </div> <div style="text-align: center;"> <p>Fig.C</p>  </div> </div> <p>Identify and explain the category of above Figures A,B and C with reference to machine learning model fit.</p>	02	CO1	Ap										
ii)	<p>Consider applying linear regression with the hypothesis as</p> $h_{\theta}(x) = \theta_0 + \theta_1 x$ <p>The training data is given in a table below</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td> <td>6</td> <td>5</td> <td>10</td> <td>3</td> </tr> <tr> <td>Y</td> <td>7</td> <td>4</td> <td>9</td> <td>4</td> </tr> </table> <p>We define Mean square Error (MSE) as</p> $J_{\theta} = \frac{1}{2m} \sum_{i=1}^m (h_{\theta}(x_i) - y_i)^2$ <p>Where m is the number of training examples. <math>h_{\theta}(x_i)</math> is the value of linear regression hypothesis at point i. If <math>\theta=[1,1]</math> find <math>J_0</math></p>	X	6	5	10	3	Y	7	4	9	4	02	CO2	Ap
X	6	5	10	3										
Y	7	4	9	4										
iii)	Explain the following terms 1. Stumping      2. Gini Index	02	CO3	U										
iv)	Explain Radial basis function network.	02	CO4	U										
v)	Explain role of dimensionality reduction in machine learning.	02	CO6	Ap										
vi)	Enlist and explain hyper parameters of Density-Based Spatial Clustering.	02	CO5	U										
vii)	Explain kernel trick.	02	CO4	U										

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viii)	Consider the following Confusion matrix and calculate Precision and Recall. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Reality:1</th> <th style="text-align: center;">Reality:0</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">Prediction:1</th> <td style="text-align: center;">75</td> <td style="text-align: center;">5</td> </tr> <tr> <th style="text-align: center;">Prediction:0</th> <td style="text-align: center;">5</td> <td style="text-align: center;">15</td> </tr> </tbody> </table>		Reality:1	Reality:0	Prediction:1	75	5	Prediction:0	5	15	02	CO3	U						
	Reality:1	Reality:0																	
Prediction:1	75	5																	
Prediction:0	5	15																	
<b>Q.2 Solve any four questions out of six.</b>		<b>16</b>																	
i)	Explain Ruled Based Classification.	04	CO4	U															
ii)	Explain performance evaluation metrics for regression.	04	CO2	U															
iii)	Explain K-Fold cross validation.	04	CO3	U															
iv)	Explain Multiclass classification with reference to support vector machine.	04	CO4	U															
v)	Explain expectation maximization algorithm.	04	CO5	U															
vi)	Given the following data. Calculate the covariance metrics for given data. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Feature</th> <th style="text-align: center;">D1</th> <th style="text-align: center;">D2</th> <th style="text-align: center;">D3</th> <th style="text-align: center;">D4</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">13</td> <td style="text-align: center;">7</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">11</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">14</td> </tr> </tbody> </table>	Feature	D1	D2	D3	D4	X	4	8	13	7	Y	11	4	5	14	04	CO6	Ap
Feature	D1	D2	D3	D4															
X	4	8	13	7															
Y	11	4	5	14															
<b>Q.3 Solve any two questions out of three.</b>		<b>16</b>																	
i)	Explain Hidden Markov model and its related issues.	08	CO4	U															
ii)	Explain Graph based clustering and its applications. Consider the following data points and apply graph-based clustering with minimal spanning tree. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">A(1,1)</td> <td style="text-align: center;">B(1,2)</td> <td style="text-align: center;">C(3,2)</td> <td style="text-align: center;">D(3,3)</td> </tr> </tbody> </table>	A(1,1)	B(1,2)	C(3,2)	D(3,3)	08	CO5	Ap											
A(1,1)	B(1,2)	C(3,2)	D(3,3)																
iii)	Explain types of machine learning and its applications in detail.	08	CO1	U															
<b>Q.4 Solve any two questions out of three.</b>		<b>16</b>																	
i)	Explain regression and its types in detail.	08	CO2	U															
ii)	Explain role of ensemble learning and its types in detail	08	CO3	U															
iii)	Explain Linear Discriminant analysis in detail and compare it with principal component analysis.	08	CO6	U															

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