

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Feb / March 2024

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

Examination: LY Semester: VII

Course Code:CEC701 and Course Name: Machine Learning

Date of Exam: *01/03/2024*

Duration: 2.5 Hours

Max. Marks: 60

Supplementary Examination

Instructions:

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

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	A model with more parameters is more prone to overfitting and typically has higher variance, True or false. Give reason.	02	CO1	U
ii)	Define squared error loss function. List few machine learning algorithms where the squared error loss function can be applied.	02	CO2	U
iii)	What are support vectors? Draw appropriate diagram to illustrate.	02	CO4	U
iv)	What is dimensionality reduction? Briefly explain its applicability.	02	CO6	U
v)	What is clustering? Discuss any one distance measure used in clustering.	02	CO5	U
vi)	What is learning rate? How does it affect the convergence in the learning process?	02	CO3	U
vii)	Find the eigenvalues and eigenvectors of the matrix: $\begin{matrix} 5 & 2 & 0 \\ 2 & 5 & 0 \\ -3 & 4 & 6 \end{matrix}$	02	CO4	Ap
viii)	What is bootstrapping in the context of machine learning?	02	CO3	U
Q.2	Solve any four questions out of six.	16		
i)	Draw architecture of Radial Basis Function (RBF)	04	CO4	U
ii)	Demonstrate with simple example k-fold cross validation.	04	CO3	U
iii)	Discuss how logistic regression can be used for classification.	04	CO2	U
iv)	How are the clusters created using Density based clustering method DBSCAN.	04	CO5	U

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v)	Compare and contrast overfitting and underfitting with respect to variance, bias, generalization ability and model complexity.	04	CO1	U																					
vi)	Explain various distance matrices used for clustering.	04	CO3	U																					
Q.3	Solve any two questions out of three.	16																							
i)	Describe the steps in developing a machine learning application	08	CO1	U																					
ii)	Using following evidence model a linear regression line which predicts the salary (y) of a person whose experience (x) is 15 years.	08	CO2	Ap																					
	<table border="1"> <tr> <td>x</td> <td>3</td> <td>7</td> <td>8</td> <td>12</td> <td>4</td> <td>6</td> <td>10</td> <td>20</td> <td>17</td> </tr> <tr> <td>y</td> <td>30</td> <td>57</td> <td>64</td> <td>70</td> <td>35</td> <td>48</td> <td>70</td> <td>82</td> <td>78</td> </tr> </table>	x	3	7	8	12	4	6	10	20	17	y	30	57	64	70	35	48	70	82	78				
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iii)	Explain random forest with suitable example.	08	CO3	U																					
Q.4	Solve any two questions out of three.	16																							
i)	Explain Principal Component Analysis algorithm.	08	CO6	U																					
ii)	What are kernel functions? Explain applications of kernel functions in the context of SVM.	08	CO4	U																					
iii)	Explain graph based clustering. Use Euclidian distance measure to find the clusters using graph based clustering techniques for the following dataset.	08	CO5	Ap																					
	<table border="1"> <tr> <td>P1</td> <td>P2</td> <td>P3</td> <td>P4</td> <td>P5</td> <td>P6</td> <td>P7</td> </tr> <tr> <td>0.4</td> <td>0.22</td> <td>0.35</td> <td>0.25</td> <td>0.08</td> <td>0.45</td> <td>0.6</td> </tr> <tr> <td>0.5</td> <td>0.35</td> <td>0.3</td> <td>0.2</td> <td>0.4</td> <td>0.5</td> <td>0.7</td> </tr> </table>	P1	P2	P3	P4	P5	P6	P7	0.4	0.22	0.35	0.25	0.08	0.45	0.6	0.5	0.35	0.3	0.2	0.4	0.5	0.7			
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