

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

April – May 2023

Program: B.Tech Scheme I/II: II

Examination: TY Semester: VI

Course Code: AIC602 and Course Name: Machine Learning

Date of Exam: 15/5/2023

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																														
Q 1	Solve any six questions out of eight.	12																																
i)	Differentiate between Supervised and Unsupervised Learning.	2	CO1	U																														
ii)	What is learning rate? Explain how it affects convergence with examples.	2	CO3	U																														
iii)	Define ROC. What is the significance of ROC-AUC with an example	2	CO3	U																														
iv)	What are support vectors? Explain their relevance in deciding the decision boundary.	2	CO4	U																														
v)	Define dimensionality reduction. Write advantages of dimensionality reduction	2	CO6	U																														
vi)	List some advantages and disadvantages of Naive Bayes Classifier.	2	CO4	U																														
vii)	Define optimization. List different types of optimization techniques.	2	CO5	U																														
viii)	Find the inverse of the matrix: $A = \begin{bmatrix} 2 & -3 \\ 4 & -7 \end{bmatrix}$	2	CO2	U																														
Q.2	Solve any four questions out of six.	16																																
i)	Using KNN, predict whether a person with age 27 and salary 67000 will buy a car or not. Consider k=3; <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Age</th> <th>20</th> <th>32</th> <th>18</th> <th>29</th> <th>47</th> <th>45</th> <th>46</th> <th>48</th> <th>45</th> </tr> </thead> <tbody> <tr> <th>Salary</th> <td>86000</td> <td>18000</td> <td>82000</td> <td>80000</td> <td>25000</td> <td>26000</td> <td>28000</td> <td>29000</td> <td>22000</td> </tr> <tr> <th>Buy</th> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	Age	20	32	18	29	47	45	46	48	45	Salary	86000	18000	82000	80000	25000	26000	28000	29000	22000	Buy	0	0	0	0	1	1	1	1	1	4	CO3	Ap
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ii)	What are kernel functions? Explain their application in the context of SVM.	4	CO4	U
iii)	Differentiate between Markov model and Hidden Markov Model.	4	CO4	U
iv)	Draw a confusion matrix for a ML model that predicted 97 non-spam and 17 spam mail correctly, while 4 non-spam and 7 spam mail incorrectly. Calculate accuracy, precision, recall, F1 score.	4	CO3	Ap
v)	Find the eigenvalues and eigenvectors of the matrix: $A = \begin{pmatrix} 5 & 2 & 0 \\ 2 & 5 & 0 \\ -3 & 4 & 6 \end{pmatrix}$	4	CO2	Ap
vi)	List advantages and disadvantages of derivative based optimization techniques.	4	CO5	U
Q.3	Solve any two questions out of three.	16		
i)	Demonstrate the working of decision tree with example.	8	CO3	U
ii)	Describe the process of learning using gradient descent algorithm with respect to linear regression.	8	CO1	U
iii)	Write short note on Principal Component Analysis.	8	CO6	U
Q.4	Solve any two questions out of three.	16		
i)	Find the clusters using single link technique. Use Euclidean distance and draw dendrogram. Sample X Y P1 0.40 0.53 P2 0.22 0.38 P3 0.35 0.32 P4 0.26 0.19 P5 0.08 0.41 P6 0.45 0.30	8	CO4	Ap
ii)	Describe Down Hill Simplex method. Why is it called the Derivative free method?	8	CO5	U
iii)	Explain logistic regression in detail with example. Give the hypothesis and cost function for logistic.	8	CO2	U
