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

May -June 2023
(M.Tech.) Program: Artificial Intelligence Scheme: II
Examination: FY Semester: II I
Course Code: PCEC102 and Course Name: Machine Learning and Pattern Recognition

Date of Exam: 26/6/23 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)	Compare overfitting and underfitting.	2	CO3	U
ii)	Explain significance of K value in K-means algorithm.	2	CO4	U
iii)	What is Inductive Bias?	2	CO1	U
iv)	Write a note on assumption/s of Naïve Bayesian classifier.	2	CO4	U
v)	Write use of Fishers Linear discriminant function.	2	CO2	U
vi)	List the parameters for analysis of classification.	2	CO6	U
vii)	Compare Bagging and Boosting classifiers.	2	CO5	U
viii)	Which type of data is preferable for classification algorithm. (nominal or numeric) Justify the reason.	2	CO3	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	Illustrate characteristics of Decision Tree with example.	4	CO3	U
ii)	Explain any 4 model evaluation approaches with example.	4	CO1	U
iii)	Explain Support and Confidence in association rule mining.	4	CO6	U
iv)	Is Ada-boost algorithm recursive / iterative. Justify your reason.	4	CO5	U
v)	What do you mean by Curse of dimensionality? Differentiate between feature selection and feature extraction.	4	CO2	U
vi)	Compare single linkage and complete linkage methods to measure the distance between clusters.	4	CO4	U

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

May -June 2023
(M.Tech.) Program: Artificial Intelligence Scheme: II
Examination: FY Semester: I
Course Code: PCEC102 and Course Name: Machine Learning and Pattern Recognition
Date of Exam: 26/6/23 Duration: 2.5 Hours Max. Marks: 60

<table>
<tr><td>Q.3</td><td>Solve any two questions out of three.</td><td>16</td><td></td><td></td></tr>
<tr><td>i)</td><td>Given the following data, use PCA to reduce the dimension from 2 to 1.
<table>
<tr><td>Feature</td><td>Example1</td><td>Example 2</td><td>Example 3</td><td>Example 4</td></tr>
<tr><td>X</td><td>4</td><td>8</td><td>13</td><td>7</td></tr>
<tr><td>Y</td><td>11</td><td>4</td><td>5</td><td>14</td></tr>
</table></td><td>8</td><td>CO2</td><td>AP</td></tr>
<tr><td>ii)</td><td>Illustrate Linear regression in machine learning. What are the different types? What are the measures uses for cost function of linear regression.</td><td>8</td><td>CO3</td><td>U</td></tr>
<tr><td>iii)</td><td>Using the below table illustrate Bayesian Classification. Further indicate how we can classify a new record with (Income=Medium and Credit=Good).
<table>
<tr><td>Income</td><td>Credit</td><td>Decision</td></tr>
<tr><td>Very High</td><td>Excellent</td><td>Authorize</td></tr>
<tr><td>High</td><td>Good</td><td>Authorize</td></tr>
<tr><td>Medium</td><td>Excellent</td><td>Authorize</td></tr>
<tr><td>High</td><td>Good</td><td>Authorize</td></tr>
<tr><td>Very High</td><td>Good</td><td>Authorize</td></tr>
<tr><td>Medium</td><td>Excellent</td><td>Authorize</td></tr>
<tr><td>High</td><td>Bad</td><td>REQUEST ID</td></tr>
<tr><td>Medium</td><td>Bad</td><td>REQUEST ID</td></tr>
<tr><td>High</td><td>Bad</td><td>REJECT</td></tr>
<tr><td>Low</td><td>Bad</td><td>CALL POLICE</td></tr>
</table></td><td>8</td><td>CO4</td><td>AP</td></tr>
<tr><td>Q.4</td><td>Solve any two questions out of three.</td><td>16</td><td></td><td></td></tr>
<tr><td>i)</td><td>Describe ensemble approaches for classification with example.</td><td>8</td><td>CO5</td><td>U</td></tr>
<tr><td>ii)</td><td>How to define the correct value of K (clusters) in Clustering algorithm?
Cluster given data using k-means where k, D = {23, 23, 27, 27, 39, 41, 47, 49, 50, 52, 54, 54, 56, 57, 58, 58, 60, 61}</td><td>8</td><td>CO3</td><td>AP</td></tr>
<tr><td>iii)</td><td>What is the use of Hyperplane in SVM. Explain with suitable example.</td><td>8</td><td>CO4</td><td>U</td></tr>
</table>