

Model Question Paper-1 with effect from 2022(CBCS Scheme)

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Sixth Semester B.E. Degree Examination MACHINE LEARNING

TIME: 03 Hours

Max.Marks:100

Note:1. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module-1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Explain in detail ML Process Model	L1	CO1	8
	b	How Does Machine Learning Collaborate with Data Science to Improve Data Analysis and Decision-Making?	L1	CO1	5
	c	For the Given Univariate Data Set $S=\{20,25,30,35,40\}$ Find Mean, Mode, Median, Standard Deviation and Variance	L3	CO1	7
OR					
Q.02	a	List out Major Application of ML	L2	CO1	8
	b	How do you detect outliers in univariate data, and what are common techniques for identifying them?	L2	CO1	6
		Explain the different types of Machine Learning with suitable examples.	L2	CO1	6
Module-2					
Q.03	a	What is a Confusion Matrix, And How is it Used to Evaluate the Performance of a Classification Model?	L2	CO2	6
	b	Solve The Following Set of Equation Using Gaussian Elimination Method $2x+3y=8$ $4x+5y=10$	L3	CO2	8
		Compute the Singular Value Decomposition (SVD) of the matrix $A = \begin{bmatrix} 4 & 0 \\ 3 & -5 \end{bmatrix}$	L3	CO2	6
OR					
Q.04	a	Apply PCA For the Following Matrix and Prove It Works $\begin{Bmatrix} 4 \\ 3 \end{Bmatrix}$ $\begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$	L3	CO2	10
	b	Find Covariance and correlation coefficient for the following two set of data and Do analysis of bivariate data, and what does a correlation coefficient indicate? $X: 1 \ 2 \ 6 \ 12 \ Y: 8 \ 12 \ 18 \ 22$	L3	CO2	10
Module-3					

Q.05	a	<p>Consider the following training dataset of 10 data instances shown in Table 4.12 which describes the award performance of individual students based on GPA and No. of projects done. The target variable is 'Award' which is a discrete valued variable that takes 2 values 'Yes' or 'No'.</p> <p>Table 4.12: Training Dataset</p> <table><tr><th>S.No.</th><th>GPA</th><th>No. of Projects Done</th><th>Award</th></tr><tr><td>1.</td><td>9.5</td><td>5</td><td>Yes</td></tr><tr><td>2.</td><td>8.0</td><td>4</td><td>Yes</td></tr><tr><td>3.</td><td>7.2</td><td>1</td><td>No</td></tr><tr><td>4.</td><td>6.5</td><td>5</td><td>Yes</td></tr><tr><td>5.</td><td>9.5</td><td>4</td><td>Yes</td></tr><tr><td>6.</td><td>3.2</td><td>1</td><td>No</td></tr><tr><td>7.</td><td>6.6</td><td>1</td><td>No</td></tr><tr><td>8.</td><td>5.4</td><td>1</td><td>No</td></tr><tr><td>9.</td><td>8.9</td><td>3</td><td>Yes</td></tr><tr><td>10.</td><td>7.2</td><td>4</td><td>Yes</td></tr></table> <p>Given a test instance (GPA - 7.8, No. of projects done - 4), use the training set to classify the test instance. Choose $k = 3$.</p> <ul style="list-style-type: none">• k-Nearest Neighbor classifier• Weighted k-Nearest Neighbor classifier• Nearest Centroid Classifier	S.No.	GPA	No. of Projects Done	Award	1.	9.5	5	Yes	2.	8.0	4	Yes	3.	7.2	1	No	4.	6.5	5	Yes	5.	9.5	4	Yes	6.	3.2	1	No	7.	6.6	1	No	8.	5.4	1	No	9.	8.9	3	Yes	10.	7.2	4	Yes	L4	CO3	12
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	b	Explain the different types of regression models used in Machine Learning with examples	L3	CO3	8																																												
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Q.06	a	Differentiate instance and model-based learning	L2	CO3	6																																												
	b	Explain the different types of regression models used in Machine Learning with examples	L2	CO3	6																																												
	C	<p>Given the following data, fit a linear regression model using the least squares method and predict the value of y when $x=6$</p> <table><tr><td>X</td><td>y</td></tr><tr><td>1</td><td>2</td></tr><tr><td>2</td><td>3</td></tr><tr><td>4</td><td>3</td></tr><tr><td>3</td><td>2</td></tr><tr><td>5</td><td>5</td></tr></table>	X	y	1	2	2	3	4	3	3	2	5	5	L4	CO3	8																																
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Module-4																																																	
Q.07	a	<p>Describe the process of constructing a decision tree using ID3 algorithm to following data set.</p> <p>Weather Temperature Play</p> <table><tr><td>Sunny</td><td>Hot</td><td>No</td></tr><tr><td>Sunny</td><td>Mild</td><td>No</td></tr><tr><td>Overcast</td><td>Hot</td><td>Yes</td></tr><tr><td>Rain</td><td>Cool</td><td>Yes</td></tr><tr><td>Rain</td><td>Mild</td><td>Yes</td></tr><tr><td>Rain</td><td>Cool</td><td>No</td></tr><tr><td>Overcast</td><td>Cool</td><td>Yes</td></tr><tr><td>Sunny</td><td>Cool</td><td>Yes</td></tr></table>	Sunny	Hot	No	Sunny	Mild	No	Overcast	Hot	Yes	Rain	Cool	Yes	Rain	Mild	Yes	Rain	Cool	No	Overcast	Cool	Yes	Sunny	Cool	Yes	L4	CO4	8																				
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	b	What is information gain? How is it used in decision trees? Explain	L2	CO4	6																																												
	C	Define entropy in the context of decision trees.	L2	CO4	4																																												
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Q.08	A	<p>Given the following dataset, construct the first split of the decision tree using the C4.5 algorithm. Show all calculations including entropy, information gain, and gain ratio.</p> <p>Weather Temperature Play</p> <table><tr><td>Sunny</td><td>Hot</td><td>No</td></tr><tr><td>Sunny</td><td>Mild</td><td>No</td></tr></table>	Sunny	Hot	No	Sunny	Mild	No	L4	CO4	10																																						
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		Overcast Hot Yes Rain Cool Yes Rain Mild Yes Rain Cool No Overcast Cool Yes Sunny Cool Yes			
	b	Explain how Naïve Bayes algorithm handles continuous attributes. Suppose we want to classify a person with: <ul style="list-style-type: none"> • Height = 170 • Weight = 70 Height (cm) Weight (kg) Class 180 80 Fit 165 65 Fit 155 60 Unfit 160 55 Unfit	L4		10
Module-5					
Q.09	a	Define Artificial Neural Networks. What are their key components	L2	CO5	6
	b	Explain any two real-world applications of Artificial Neural Networks in detail.	L2	CO5	4
	c	How multi-layer- Perceptron solves the XOR problem. Design MLP with back propagation to implement the XOR Boolean function	L2	CO5	10
OR					
Q.10	a	Differentiate between Partitional and Hierarchical clustering methods.	L2	CO5	8
	b	List and explain different types of Artificial Neural Networks	L2	CO5	8
	C	List and explain any four advantages of Artificial Neural Networks.	L2	CO5	4

