QP.Code	U21AM-1A	Reg.No	

KPR Institute of Engineering and Technology
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Learn Beyond

Dept.: CSE(AI&ML)
Ac.Yr.: 2024 – 2025

Course Code & Title	:	U21AM401	Machine Learning 1	
Year	:	II	Semester: 04	Date: 27.3.2024 - AN
CIAT	:	I	Duration: 90 Minutes	Maximum Marks: 60

Q. No	Section – A (10X1=10 Marks) Answer All Questions	Marks	BT	CO
1	Which of the following scenarios is best suited for multiple linear regression? a) Predicting whether an image is of a cat, dog, or bird. b) Classifying emails as spam or not spam. c) Estimating the price of a house based on size, location and no. of floors d) Diagnosing a patient's disease from medical test results (with 5 possible diseases).	1	U	CO5
2	What is the main purpose of using polynomial regression instead of linear regression? a) To reduce the number of features in the model b) To increase the interpretability of the model c) To minimize the effect of multicollinearity d) To model non-linear relationships between the independent & dependent variables.	1	U	CO5
3	Which situation is best suited for Ridge Regression over LASSO Regression? a) When the dataset has large number of irrelevant features b) when you want to automatically eliminate non-predictive variables c) when most features are relevant and there is multicollinearity d) when you need a sparse model with few active features	1	U	CO5
4	Which of the following can reduce variance in a machine learning model? a) Increasing model complexity b) Collecting more training data c) Using a higher-degree polynomial d) Removing regularization	1	U	CO4
5	What is the purpose of softmax activation function in the output layer of a Multi-Layer Perceptron (MLP) a) To introduce non-0linearity in the hidden layers b) To convert raw scores into probabilities for multi-class classification c) To speed up the training process d) To prevent overfitting in the model	1	U	CO5
6	Which metric is not computed during the LDA process? a) Class mean vectors b) Within-class scatter matrix c) Between Class scatter matrix d) Kernel matrix	1	R	CO4
7	How does Gradient Boosting differ from Random Forest? a) Gradient Boosting uses parallel training while Random Forest is sequential b) Gradient Boosting trains models sequentially to correct previous errors c) Gradient Boosting uses majority voting while Random Forest uses weighted averages d) Gradient Boosting only works for regression problems	1	U	CO4
8	What is the purpose of the kernel trick in SVM? a) To reduce overfitting by regularization b) To improve the margin between classes c) To map data to a higher-dimensional space without computing it explicitly d) To select the best hyperplane based on cross-validation	1	U	CO4
9	Which of the following statements about Information Gain is True? a) Higher Information Gain indicates a less useful feature for splitting b) Information Gain is only applicable to numerical features c) A feature with the highest information Gain is preferred for splitting the node d) Information Gain Increases as the tree depth increases	1	A	CO1
10	Which type of cross-validation is most suitable for smaller datasets to maximize training data usage? a) K-fold Cross Validation b) Stratified Cross Validation c) Leave-One-Out Cross Validation(LOO-CV) d) Hold-Out Validation	1	U	CO1

Q.No	Section – B (10X2=20 Marks) Answer All Questions	Marks	BT	CO
11	What is a cost function, and why is it essential in machine learning models?	2	R	CO5
12	Why is the Logistic regression suitable for classification problems, and how does the sigmoid function play a key role?	2	U	CO5
13	What is the main difference between Ridge and Lasso regression in terms of their penalty terms?	2	U	CO5
14	What is the key idea behind boosting algorithm in machine learning?	2	A	CO5
15	Differentiate perceptron from multi-layer perceptron?	2	U	CO4
16	Explain the concept of information gain in decision trees	2	A	CO4
17	Why is KNN considered a non-parametric algorithm?	2	A	CO4
18	What is the difference between a hard margin and a soft margin in SVM?	2	R	CO4
19	What are the assumptions made by LDA for classification?	2	U	CO1
20	Why is k-fold cross-validation preferred over a simple train-test split?	2	A	CO1

Q.No		Section – C (1X6=6 Marks & 2X12=24 Marks) Answer All Questions	Marks	BT	CO
21 a)		Describe the working mechanism of each agent type and analyze their advantages and disadvantages in real-world applications	6	U	CO1
		(Or)			
21 b)		Explain the different types of environments in Artificial Intelligence with examples	6	U	CO1
22 a)	i	Describe the process of constructing a Decision Tree using Splitting criteria and explain how the tree makes predictions	6	R	CO4
	ii	Explain the Naïve Bayes Algorithm with its mathematical formulation and working principle.	6	Ap	CO4
		(Or)			
22 b)	i	Explain the Bias-Variance Tradeoff in machine learning with its impact on model performance	6	Ap	CO4

	ii	Explain the K-Nearest Neighbors (KNN) algorithm, including the working principle, distance metric, and how K affects model performance.	6	Ap	CO4
23 a)		Explain Linear Regression and Logistic Regression with their Cost functions and gradient descent steps. Describe how Ridge and Lasso Regression modify these functions for Regularization and their impact on model complexity.	12	A	CO5
		(Or)			
23 b)		Explain Bagging and Boosting and describe their key algorithms.	12	A	CO5