R21_CS603C - MACHINE LEARNING

Part A
Answer any ten from the following, choosing the correct alternative of each question: 10×1=10

1.	Which of the following is NOT a distance-based method for classification?	**(1)**	CO 2	PO 2	BL 1
	(a) K-Nearest Neighbors (K-NN) (b) Decision Trees (c) Euclidean Distance (d) Mahalanobis Distance				
2.	In linear Regression, the objective is to minimize which of the following?	**(1)**	CO 1	PO 1	BL 2
	(a) Classification error (b) Cross-entropy loss (c) Sum of squared residuals (d) Logloss				
3.	Association Rule Mining for Market Basket analysis is based on the concept of	**(1)**	CO 2	PO 2	BL 1
	(a) Supervised Learning (b) Unsupervised Learning (c) Reinforcement Learning (d) None of the above				
4.	The Letter-Grade Score in an examination is an example of	**(1)**	CO 2	PO 1	BL 1
	(a) Categorical and nominal variable (b) Categorical and ordinal variable (c) Discrete Quantitative variable (d) Continuous Quantitative variable				
5.	Association Rule Mining for Market Basket analysis is based on the concept of	**(1)**	CO 1	PO 2	BL 2
	(a) Supervised Learning (b) Unsupervised Learning (c) Reinforcement Learning (d) None of the above				
6.	What is the primary objective of regression in machine learning?	**(1)**	CO 2	PO 2	BL 2
	(a) To classify data into distinct categories (b) To predict continuous numerical values (c) To reduce the dimensionality of data (d) To group similar data points together				
7.	Which of the following models can be used for multi-class classification?	**(1)**	CO 4	PO 4	BL 2
	(a) Logistic Regression (b) Decision Trees (c) Support Vector Machine (SVM) (d) All of the above				
8.	What is the main advantage of sparse modeling?	**(1)**	CO 5	PO 5	BL 1
	(a) It reduces the need for large amounts of training data. (b) It improves model interpretability by using only a small subset of features. (c) It increases computational complexity by requiring more resources. (d) It leads to overfitting by relying on too many variables.				
9.	What is a key challenge in time-series modeling?	**(1)**	CO 5	PO 5	BL 4
	(a) Identifying the most suitable regression model (b) Handling seasonality and trend patterns (c) Predicting categorical outcomes (d) Managing high-dimensional data				
10.	Transfer learning is useful because:	**(1)**	CO 2	PO 3	BL 3
	(a) It reduces the need for large datasets in new tasks. (b) It speeds up model training by reusing pre-trained features. (c) It improves performance on tasks with limited labeled data. (d) All of the above.				
11.	Meta-learning focuses on:	**(1)**	CO 3	PO 3	BL 3
	(a) Learning how to learn (b) Optimizing hardware performance (c) Designing new activation functions (d) Memorizing large datasets				
12.	What is a primary advantage of federated learning?	**(1)**	CO 4	PO 4	BL 2
	(a) Reduces model complexity (b) Enhances data privacy (c) Increases server storage requirements (d) Centralizes all training data				

Part B
(Answer any three of the following) 3x5=15

13.	Explain the working principle of the K-Nearest Neighbors (KNN) algorithm with an example.	**(5)**	CO 1	PO 1	BL 2
14.	Describe the key componeuts of Bayesian Learning and its applications.	**(5)**	CO 3	PO 3	BL 4
15.	Explain the role of Active Learning in reducing labeling effort.	**(5)**	CO 2	PO 2	BL 3
16.	Explain the bias-variance tradeoff in statistical learning theory.	**(5)**	CO 2	PO 2	BL 3
17.	Explain LASSO and Ridge Regression in sparse modeling and estimation.	**(5)**	CO 3	PO 4	BL 4

Part C
(Answer any three of the following) 3x15=45

18.	Explain the working of K-Nearest Neighbors (KNN) and its advantages over other distance-based classification methods.	**(15)**	CO 1	PO 1	BL 2
19.	Discuss the role of kernel functions in Support Vector Machines (SVM). How do they enable non-linearity?	**(15)**	CO 3	PO 3	BL 4
20.	Discuss the importance of model selection in machine learning and explain cross-validation techniques.	**(15)**	CO 2	PO 2	BL 2
21.	Describe Principal Component Analysis (PCA) and its importance in dimensionality reduction.	**(15)**	CO 2	PO 2	BL 2
22.	Explain the working of the K-Means clustering algorithm with a suitable example.	**(15)**	CO 1	PO 1	BL 2