Reg. No.															

Question Paper Code	13420

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Seventh Semester

Computer Science and Engineering

20CSPC702 - MACHINE LEARNING TECHNIQUES

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which of the following is NOT a common evaluation metric for classification problems? (a) Precision (b) Recall (c) Mean Squared Error (MSE) (d) F1 Score	*1*	*K1*	*CO1*
2.	What is concept learning in machine learning? (a) The process of categorizing objects based on their features (b) The process of inferring a Boolean-valued function from training examples (c) The process of clustering similar data points together (d) The process of dimensionality reduction	*1*	*K1*	*CO1*
3.	Which of the following is a key component of a perceptron? (a) Decision boundary (b) Hidden layers (c) Centroids (d) Activation function	*1*	*K1*	*CO2*
4.	What is the purpose of the learning rate in the back propagation algorithm? (a) To control the step size of the weight updates (b) To determine the number of layers in the network (c) To set the initial values of the weights (d) To decide the number of epochs for training	*1*	*K1*	*CO2*
5.	Why is Bayes' Theorem used for in machine learning? (a) To perform linear regression (b) To update the probability of a hypothesis based on new evidence (c) To calculate the distance between data points (d) To cluster similar data points	*1*	*K1*	*CO3*
6.	In the context of linear regression, what does the term "residual" refer to? (a) The predicted value (b) The difference between the observed and predicted values (c) The slope of the regression line (d) The intercept of the regression line	*1*	*K1*	*CO3*
7.	What is a common technique to determine the optimal value of k in KNN? (a) Cross-validation (b) Grid Search (c) Random Search (d) All of the above	*1*	*K1*	*CO4*
8.	In Locally Weighted Regression, what is the role of the query point? (a) It is the point for which the local regression model is being fitted (b) It is used to determine the overall model parameters (c) It is used to select the training examples for the model (d) It determines the global structure of the regression model	*1*	*K1*	*CO4*
9.	First-order rules in rule-based learning refer to, (a) Rules involving only single variables (b) Rules involving relations between objects (c) Rules with fixed outcomes (d) Rules that maximize accuracy	*1*	*K1*	*CO5*
10.	What does FOCL stand for? (a) First-Order Concept Language (b) Formal Object Concept Learning (c) First-Order Control Learning (d) Framework for Objective Concept Learning	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.		What is the importance of Machine Learning?	2	K1	CO1
12.		Show how version spaces are used in concept learning.	2	K2	CO1
13.		How information gain is calculated in decision tree algorithms?	2	K1	CO2
14.		How does a decision tree algorithm handles missing data?	2	K1	CO2
15.		What is role of back propagation algorithm in neural networks?	2	K1	CO3
16.		What is the vanishing gradient problem in multilayer networks?	2	K1	CO3
17.		State about the Gibbs Algorithm.	2	K1	CO4
18.		Find the formula of basic probability.	2	K1	CO4
19.		Identify how approximating a discrete-valued function is done using k-nearest neighbor algorithm.	2	K2	CO5
20.		What is meant by a "rule" in rule-based learning?	2	K1	CO5
21.		How is first-order rules are represented in machine learning?	2	K1	CO6
22.		Find the role of an agent in a reinforcement learning scenario.	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the Perspectives and issues of Machine learning in detail.	11	K2	CO1
		OR			
	b)	Demonstrate the functions of FIND-S Algorithm with a suitable example.	11	K2	CO1
24.	a)	Explain decision tree learning with an emphasis on how the algorithm constructs the tree based on training data.	11	K2	CO2
		OR			
	b)	Illustrate the ID3 Algorithm and infer the values from it.	11	K2	CO2
25.	a)	Summarize the derivation of the Back propagation algorithm and Gradient Descent algorithm.	11	K2	CO3
		OR			
	b)	Outline the common operators for Genetic algorithms and the various crossovers with diagrams.	11	K2	CO3
26.	a)	Apply the EM algorithm and examine the details of probability learning.	11	K3	CO4
		OR			
	b)	Does the patient have cancer, or does he not? A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire population have this cancer.	11	K3	CO4
27.	a)	Explain the k-nearest learning algorithm with an example.	11	K2	CO5
		OR			
	b)	Demonstrate the functions of prototypical example of a case-based reasoning system.	11	K2	CO5
28.	a)	Discuss the practical applications of reinforcement learning in real-world scenarios, providing specific examples.	11	K2	CO6
		OR			
	b)	Explain the Q-learning algorithm step by step, including its update mechanism and application.	11	K2	CO6