Reg. No.															

Question Paper Code	14249

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

First Semester

M.E. - Computer Science and Engineering

(Common to Computer Science and Engineering (with Specialization in Networks))

24PCSPW101 – ADVANCED MACHINE LEARNING WITH LABORATORY

Regulations - 2024

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The process of using past data to predict future outcomes is called (a) Clustering (b) Regression (c) Association (d) Data mining	1	K2	CO1
2.	In Machine Learning, training data refers to (a) Data used to test the system (b) Data used to adjust model parameters (c) Data not used in learning (d) Data used only for validation	1	K2	CO1
3.	A Radial Basis Function (RBF) depends on: (a) The distance from a center point (b) Linear combinations of inputs (c) The number of neurons only (d) Random initialization	1	K2	CO2
4.	Back propagation is based on the principle of (a) Gradient Descent (b) Random Search (c) K-means Clustering (d) Principal Component Analysis	1	K2	CO2
5.	What is the main goal of a Decision Tree algorithm? (a) To minimize the number of nodes (b) To maximize the entropy (c) To minimize the impurity in the data split (d) To reduce the number of features used	1	K2	CO3
6.	CART stands for (a) Classification and Regression Techniques (b) Classification and Regression Trees (c) Computerized Analytical Regression Trees (d) Conditional Algorithm Regression Trees	1	K2	CO3
7.	The number of discriminant axes in LDA is at most (a) Number of features (b) Number of samples (c) Number of classes minus one (d) Number of classes	1	K2	CO4
8.	The main goal of dimensionality reduction is to (a) Increase the number of variables in the dataset (b) Eliminate redundant and irrelevant features (c) Add noise to the dataset (d) Normalize all features	1	K2	CO4
9.	In a genetic algorithm, a population refers to (a) A set of possible solutions (b) The best single solution (c) The fitness function (d) The mutation probability	1	K2	CO5
10.	In reinforcement learning, the environment is often modeled as (a) A classification problem (b) A Markov Decision Process (c) A neural network (d) A regression model	1	K2	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	List the components of a learning system.	2	K2	CO1
12.	Name two common activation functions.	2	K2	CO1
13.	List the benefits of Neural Network.	2	K2	CO2
14.	Show the main steps in back propagation.	2	K2	CO2
15.	Give the main steps used in K-Means Clustering algorithm.	2	K2	CO3

16.	Explain the need for learning in classification.	2	K2	CO3
17.	Mention the role of Factor Analysis in Scale development.	2	K2	CO4
18.	Discuss about how PCA differs from LDA.	2	K2	CO4
19.	Demonstrate the method of Markov decision process.	2	K2	CO5
20.	Summarize the purpose of mutation in a Genetic Algorithm.	2	K2	CO5
21.	Outline the importance of hidden layers in MLP.	2	K2	CO2
22.	Explain Bagging and Boosting.	2	K2	CO3

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a) (i)	Explain how Concept learning can be viewed as a Search problem with the help of General to specific ordering of Hypotheses.	6	K2	CO1
	(ii)	Explain in detail about the Perspectives and Issues in Machine Learning with a suitable problem.	5	K2	CO1
		OR			
	b) (i)	Linear regression is supervised learning. Justify it with suitable examples.	6	K2	CO1
	(ii)	Explain the steps involved in designing a learning system.	5	K2	CO1
24.	a)	Construct a Support Vector Machine with suitable example.	11	K3	CO2
		OR			
	b)	Experiment on how the back propagation algorithm updates weights in a multilayer perceptron. How does the chain rule of calculus play a role in this process?	11	K3	CO2
25.	a)	Identify the first splitting attribute for the decision tree by using the ID3 algorithm with the following dataset.	11	K3	CO3

Age	Competition	Type	Class (profit)
Old	Yes	Software	Down
Old	No	Software	Down
Old	No	Hardware	Down
Mid	Yes	Software	Down
Mid	Yes	Hardware	Down
Mid	No	Hardware	Up
Mid	No	Software	Up
New	Yes	Software	Up
New	No	Hardware	Up
New	No	Software	Up

		OR			
	b)	Build an ensemble learning model in a real world application and show the result.	11	K3	CO3
26.	a)	Analyze Independent Component Analysis for Dimension Reduction.	11	K4	CO4
		OR			
	b)	Inspect a Linear Embedding algorithm for an example application.	11	K4	CO4
27.	a)	Examine how crossover and mutation operations interact to balance exploration and exploitation in a Genetic Algorithm.	11	K4	CO5
		OR			
	b)	Compare Reinforcement learning with inverse Reinforcement learning.	11	K4	CO5
28.	a)	Construct an elaborated notes on Hidden Markov Model with Suitable Example.	11	K3	CO2
		OR			
	b)	Build a Bayesian Network for a medical diagnosis system.	11	K3	CO2