Reg. No.															

Question Paper Code	13679

M.E. - DEGREE EXAMINATIONS, APRIL / MAY 2025

First Semester

M.E. - Computer Science and Engineering

20PCSPW101 - ADVANCED MACHINE LEARNING WITH LABORATORY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What are the objectives of machine learning?	2	K1	CO1
2.	Define candidate – elimination algorithm.	2	K1	CO1
3.	Show the picture of a sample multilayer perceptron.	2	K2	CO2
4.	Illustrate Bayesian networks with a model.	2	K2	CO2
5.	What is entropy and information gain?	2	K1	CO3
6.	Build the working model of a Gaussian mixture.	2	K3	CO3
7.	Illustrate on principal component analysis and method of choosing it.	2	K2	CO4
8.	Considering y=mx+c, Find the least square regression with optimization.	2	K1	CO4
9.	List the different types of activation functions.	2	K1	CO5
10.	Compare deterministic and non-deterministic Q learning.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Explain version spaces and candidate - elimination algorithm in detail with suitable example.	13	K2	CO1
		OR			
	b) (i)	Discuss on machine learning and its types.	5	K2	CO1
	(ii)	Find the linear regression line y=ax+b and show the value of y when x=10.	8	K2	CO1

x	1	2	3	4	5	6	7
y	3	4	5	5	6	8	10

12.	a)	What is a Support Vector Machine? Interpret and Plot the hyperplanes for the following points (1,1), (2,1), (1,-1), (2,-1), (4,0), (5,1), (5,-1), (6,0).	13	K2	CO2
		OR			
	b)	What is a Bayesian network? Explain the steps followed to construct a Bayesian network with an example.	13	K2	CO2

13. a) (i) Summarize about the functions of bagging and boosting. *5 K2 CO3*

(ii) Outline the steps in the AdaBoost algorithm with an example. *8 K2 CO3*

OR

b) Demonstrate the steps involved in expectation maximization algorithm. *13 K2 CO3*

14. a) How does a Principal Component Analysis algorithm works? Examine the construction of eigen values and vectors in its construction. *13 K4 CO4*

OR

b) What is multi-dimensional scaling (MDS) algorithm? Discover pairwise distance construction using Isomap. *13 K4 CO4*

15. a) (i) Explain how Sequential Covering algorithm learns rule sets. *7 K2 CO5*

(ii) Illustrate FOIL algorithm of learning First-order rules. *6 K2 CO5*

OR

b)(i) Develop a genetic program to perform a task to develop a general algorithm for stacking the blocks into a single stack that spells the word "universal". *7 K3 CO5*

(ii) Identify the functions of Reinforcement Learning with an example. *6 K3 CO5*

PART - C (1× 15 = 15 Marks)

16. a) Construct a decision tree using ID3 algorithm by estimating entropy and information gain for the following data. *15 K3 CO3*

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

OR

b) Consider the following data points {(1,1), (2,1), (2,3), (3,2), (4,3), (5,5)} with the coordinates as a two-dimensional sample for clustering. Apply k-means algorithm on the above data set and required number of clusters are k=2. *15 K3 CO3*