

Reg.No.: 

--	--	--	--	--	--	--	--	--	--



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 50047**

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JAN. / FEB. 2026  
First Semester  
Computer Science and Engineering  
P23CS102 – MACHINE LEARNING TECHNIQUES  
(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

**PART – A**

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Mention the various issues in machine learning.	2	K2	CO1
2.	Distinguish between bagging and boosting.	2	K2	CO1
3.	Justify the necessity for dimensionality reduction in the context of machine learning.	2	K2	CO2
4.	In what circumstances is supervised learning better than unsupervised learning?	2	K2	CO2
5.	List out various undirected graphical models.	2	K2	CO3
6.	What are the conditional independence properties?	2	K1	CO3
7.	Distinguish between model-based and model-free learning.	2	K2	CO4
8.	Define exploration and exploitation in reinforcement learning.	2	K1	CO4
9.	Define Spectral clustering.	2	K1	CO5
10.	How do you learn from streaming data?	2	K2	CO5

**PART – B**

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	With appropriate examples, explain the various types of machine learning approaches and elaborate the steps in designing the learning system.	13	K2	CO1

		(OR)			
	b)	Explain in detail about Support Vector Machine (SVM) from the perspective of a non-linear kernel. Also derive the margin of the support vector machines with an example.	13	K2	CO1
12.	a)	Consider five points with the following coordinates as a two dimensional sample for clustering. $x_1 = (0.5, 1.75)$ $x_2 = (1, 2)$ $x_3 = (1.75, 0.25)$ $x_4 = (4, 1)$ $x_5 = (6, 3)$ Illustrate the k-means algorithm on the above data set. The required number of clusters is two, and initially, clusters are formed from random distribution of samples. $c_1 = (x_1, x_2, x_4)$ $c_2 = (x_3, x_5)$	13	K2	CO2
		(OR)			
	b)	Elucidate the Principal Component Analysis (PCA) algorithm that reduces the dataset dimensionality with retention of information. Explain how PCA works for the data points (2,6) and (1,7). Find the transformed data.	13	K2	CO2
13.	a)	Describe Bayesian network, and also justify the importance of Bayesian network as used to infer values of target variables.	13	K2	CO3
		(OR)			
	b)	List down all the parameters of a hidden Markov model and explain in detail about how the Baum Welch algorithm adjusts model parameters.	13	K2	CO3
14.	a)	Elaborate temporal difference learning algorithm with appropriate examples.	13	K1	CO4
		(OR)			
	b)	i. Elucidate the working of Q-Learning model.	6	K2	CO4
		ii. Expound K-armed bandit algorithm and its role in decision making.	7	K2	
15.	a)	Explicate the various performance metrics to evaluate a deep-learning model with examples.	13	K2	CO5
		(OR)			
	b)	Expound Conditional Random Fields (CRFs) with suitable examples.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	<p>Consider an application of "buying a new computer" based on the list of hardware specifications that best suit the needs for the cheapest option available. Build a machine learning model that can estimate the price of a computer system by taking into account its various features. Identify sample basic computer dataset which can help to develop a price estimation model that can analyze historical data and identify patterns and trends in the relationship between computer specifications and prices. By training a machine learning model on this data, the model can learn to make accurate predictions of prices for new or unseen computer components. Apply any two-suitable machine learning algorithms which can effectively capture complex relationships between features and prices, leading to more accurate price estimates. Compare and justify with</p> <ol style="list-style-type: none"> <li>set of features,</li> <li>set of training and testing dataset. Suggest associated probability, if any based on the chosen ML technique.</li> <li>Application (workout) chosen algorithm on the dataset.</li> </ol>	15	K2	CO1

(OR)

b)	<p>Consider the following list that contains name, age, gender and class of sports. In the Gender field, males are denoted by the numeric value 0 and females by 1. Using the K-Nearest Neighbour (KNN) algorithm, find a class of sports for a girl whose name is Angelina, her k factor is 3 and her age is 5.</p>	15	K2	CO2
----	--	----	----	-----

Ajay	32	0	Football
Mark	40	0	Neither
Sara	16	1	Cricket
Zaira	34	1	Cricket
Sachin	55	0	Neither
Rahul	40	0	Cricket
Pooja	20	1	Neither
Smith	15	0	Cricket
Laxi	55	1	Football
Michael	15	0	Football