

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026***Fourth Semester**Artificial Intelligence and Data Science***UADT24401 / AL3451 – Machine Learning***Regulations – 2024 & 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Provide any four applications of machine learning to solve real-world problems.	L2	1	2
2.	Infer the concept of bias-variance trade-off.	L2	1	2
3.	Mention any two types of supervised learning algorithms and its uses cases.	L2	2	2
4.	Differentiate between generative and discriminative models.	L2	2	2
5.	Identify the role of bagging in ensemble learning.	L3	3	2
6.	Narrate the role of Expectation Maximization in Gaussian Mixture Models.	L2	3	2
7.	List any two activation functions used in neural networks.	L1	4	2
8.	Why the ReLU activation function is preferred over sigmoid in deep networks?	L2	4	2
9.	Name any two performance evaluation metrics used in machine learning.	L1	5	2
10.	How does the K-fold Cross Validation technique work?	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Explain the concept of Vapnik-Chervonenkis (VC) dimension. Give suitable examples.	L2	1	8
	ii Interpret the primary components and assumptions of the PAC model and show the importance and functionalities of each components.	L2	1	8
	Or			
	b i Describe the different types of machine learning with suitable examples.	L2	1	8
	ii Infer the importance of a hypothesis in machine learning. Interpret the types of hypothesis spaces.	L2	1	8
12.	a Compare and contrast logistic regression with linear regression. Explain with examples.	L2	2	16
	Or			
	b i Illustrate how a decision tree is constructed. Explain the criteria used for attribute selection.	L2	2	8
	ii Describe the concept of random forests. How does it improve over individual decision trees?	L2	2	8

13.	a	Compare and contrast supervised and unsupervised learning approaches. Give suitable examples for each.	L2	3	16
	Or				
	b	Explain Gaussian Mixture Models (GMM) in detail. How is the Expectation-Maximization (EM) algorithm used to train GMMs?	L2	3	16
14.	a	Apply the back-propagation algorithm to train a multilayer perceptron for a given dataset.	L3	4	16
	Or				
	b	Experiment the working principles of batch normalization and dropout in a deep neural network. How do they impact training and performance? Illustrate with an example.	L3	4	16
15.	a	Demonstrate how to measure the performance of a classifier using accuracy, precision, recall, F1-score, and ROC-AUC. Apply these metrics to a sample confusion matrix.	L3	5	16
	Or				
	b	Apply the K-fold cross-validation paired t-test for comparing two machine learning models on a given dataset.	L3	5	16