Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

MCA DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Third Semester

Master of Computer Applications

MC4301 / PMCT2431- Machine Learning

Regulations – 2021 & 2024

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Mention any three applications of Machine Learning.	L1	1	2
2.	What is meant by data quality in Machine Learning?	L1	1	2
3.	Give one method to improve model performance.	L1	2	2
4.	What is feature transformation?	L1	2	2
5.	State the Maximum Likelihood Principle.	L2	3	2
6.	List the advantages of Bayesian Learning.	L1	3	2
7.	Write the hypothesis function for Logistic Regression.	L1	4	2
8.	Differentiate between Sigmoid and ReLU activation functions.	L2	4	2
9.	Differentiate between bagging and boosting.	L2	5	2
10.	State the advantages of non-parametric models over parametric models.	L1	5	2

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

Q.No			*Questions*	*BTL*	*CO*	*Marks*
11.	a	i	Describe types of machine learning.	L2	1	8
		ii	Discuss problems that cannot be solved using machine learning with reasons.	L2	1	8
			Or			
	b		Describe the different types of data in ML (structured, unstructured, semi-structured) with suitable examples.	L2	1	16
12.	a		Explain the process of model selection and training, including interpretability considerations.	L2	2	16
			Or			
	b		Explain feature engineering in detail, covering feature transformation and feature subset selection with practical examples.	L2	2	16
13.	a		A medical test is 98% accurate for detecting a disease when present, and 95% accurate for showing no disease when absent. The disease occurs in 0.5% of the population. Compute the probability that a person who tests positive actually has the disease. (Use Bayes' Theorem).	L3	3	16
			Or			
	b		Describe the Expectation-Maximization (EM) Algorithm. Explain its steps with a suitable example.	L3	3	16

14.	a	Describe the problem of overfitting in machine learning and discuss how Regularization (L1 and L2) can be used to minimize it. Include mathematical justification.	L3	4	16
		Or			
	b i	Compare and contrast Perceptron and Logistic Regression models in terms of decision boundaries, learning rules, and convergence.	L3	4	8
	ii	Explain how Regularization and Dropout techniques reduce overfitting in neural networks.	L3	4	8
15.	a	Construct a Decision Tree for the dataset below using the Information Gain method:	L3	5	16

#	Outlook	Temperature	Humidity	Wind	Play
1	Sunny	Hot	High	Weak	No
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	Yes
5	Rain	Cool	Normal	Weak	Yes
6	Rain	Cool	Normal	Strong	No
7	Overcast	Cool	Normal	Strong	Yes
8	Sunny	Mild	High	Weak	No
9	Sunny	Cool	Normal	Weak	Yes
10	Rain	Mild	Normal	Weak	Yes
11	Sunny	Mild	Normal	Strong	Yes
12	Overcast	Mild	High	Strong	Yes
13	Overcast	Hot	Normal	Weak	Yes
14	Rain	Mild	High	Strong	No

Or

	b	Illustrate with an example how SVM kernels transform non-linearly separable data into a higher-dimensional feature space for classification.	L3	5	16