III B. Tech II Semester (CSE)

23CS32T1 –MACHINE LEARNING

Course Category:	Professional Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Prerequisite:	• Knowledge in Machine Learning	**Sessional Evaluation:** **Univ. Exam Evaluation:** **Total Marks:**	30 70 100
Course Objectives:	**Students undergoing this course are expected:**		
	• Define machine learning and its different types (supervised and unsupervised) and understand their applications. • Apply supervised learning algorithms including decision trees and k-nearest neighbors (k-NN). • Implement unsupervised learning techniques, such as K-means clustering.		

Course Outcomes:	**Upon successful completion of the course, the students will be able to:**	
	CO1	Identify machine learning techniques suitable for a given problem.
	CO2	Solve real-world problems using various machine learning techniques.
	CO3	Apply Dimensionality reduction techniques for data preprocessing.
	CO4	Explain what is learning and why it is essential in the design of intelligent machines.
	CO5	Evaluate Advanced learning models for language, vision, speech, decision making etc.
Course Content:	**UNIT-I** **Introduction to Machine Learning:** Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets. **UNIT-II** **Nearest Neighbor-Based Models:** Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.	

	UNIT-III **Models Based on Decision Trees:** Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. The Bayes Classifier: Introduction to the Bayes Classifier, Bayes‘ Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC) **UNIT-IV** **Linear Discriminants for Machine Learning:** Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP. **UNIT-V** **Clustering :** Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.
Text Books & References Books:	**TEXTBOOKS:** 1. Machine Learning Theory and Practice‖, M N Murthy, V S Ananthanarayana, Universities Press (India), 2024 **REFERENCE BOOKS:** 1. Machine Learning‖, Tom M. Mitchell, McGraw-Hill Publication, 2017 2. Machine Learning in Action‖,Peter Harrington, DreamTech 3. Introduction to Data Mining‖, Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.