Machine Learning Lab

Course Code	23SA8653	**Year**	III	**Semester**	II
Course Category	SAC	**Branch**	ECE	**Course Type**	Lab
Credits	2	**L-T-P**	0-1-2	**Prerequisites**	Data Structures using Python
Continuous Internal Evaluation :	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	To Describe the implementation procedures for the Machine Learning algorithms.	L2
CO2	To Apply appropriate data sets to the Machine Learning algorithms.	L3
CO3	To Use Machine Learning algorithms to solve real-world problems.	L3
CO4	To visualize predictions using machine learning algorithms.	L4
CO5	Make an effective report based on experiments.	L2

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2			3			1			1	2	
CO2	3	2			3			1			1	2	
CO3	3	3	2		3			1			1	3	
CO4	3	3		3	3			1			1	3	
CO5									3				
Avg.	**3**	**3**	**2**	**3**	**3**			**3**	**3**		**1**	**3**	

Syllabus		
Expt. No.	**Contents**	**Mapped CO**
1	Simulate basic mathematical functions to illustrate the need for simulation in validating ML models.	CO1,CO5
2	Install and configure the software required and demonstrate basic numerical operations for ML workflows.	CO2,CO5
3	Develop and evaluate a simple linear regression model on synthetic data and plot the regression line.	CO1, CO2, CO3,CO5
4	Implement logistic regression on a small dataset and visualize performance metrics	CO3, CO4, CO5
5	Build and display a decision tree for classification	CO3, CO4, CO5
6	Apply k-means clustering on sample data, determine optimal clusters using the elbow method, and visualize the clusters.	CO3, CO4, CO5
7	Perform PCA on a multidimensional dataset to reduce dimensions and visualize the transformed data.	CO3, CO4,CO5
8	Develop an SVM model for binary classification and evaluate using a confusion matrix.	CO4, CO5

9	Create a single-layer perceptron for an XOR logic function and plot its decision boundary.	CO3, CO4, CO5
10	Train a basic multilayer perceptron on the MNIST dataset and report classification accuracy.	CO3, CO4, CO5
11	Compare performance of KNN, SVM, and MLP on the same dataset using accuracy and F1-score.	CO4, CO5
12	Generate a classification report and ROC curve for a chosen model and plot the results.	CO4, CO5

Learning Resources
Text Books
1. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Publications, 1st Ed., 2016.
References
1. Anuradha Srinivasa Raghavan and Vincy Joseph, Machine Learning, Wiley India, Kindle Edition, 2020. 2. Tom M. Mitchell, Machine Learning, McGraw Hill Education, 1st Ed., International Edition, 1997.
e-Resources & other digital material
1. https://nptel.ac.in/courses/106105152 2. https://nptel.ac.in/courses/106106139 3. https://nptel.ac.in/courses/106106202 4. https://www.youtube.com/user/joshstarmer 5. https://www.youtube.com/@GoogleDevelopers/videos 6. https://www.youtube.com/user/ProfNandoDF