22DS2T2: MACHINE LEARNING

Course Name	Machine Learning		L	T	P	C	CIA	SEE	TM
Course Code	22DS2T2		4	0	0	4	30	70	100
Year of Introduction: 2021	Year of Offering: 2021	Year of Revision: 2022	Percentage of Revision: NIL						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

Course Description and Purpose: Machine Learning is a course that illustrates *Concepts* of *Machine Learning, Basics* of *Data Preprocessing* and *Feature Engineering, Supervised Learning Algorithms, Regression Algorithms, Unsupervised Learning Algorithms, concepts* of *Neural Networks*.

Course Objectives:
This course will help enable the students to understand and learn various *Concepts* of *Machine Learning, Basics* of *Data Preprocessing* and *Feature Engineering, Supervised Learning Algorithms, Regression Algorithms, Unsupervised Learning Algorithms, Concepts* of *Neural Networks.*

Course Objectives:
The learning objectives include:
- To know the concepts of *Machine Leaning*.
- To understand basics of *Data Pre-processing* and *Feature Selection.*
- To learn *Supervised Learning* and *Regression Algorithms*.
- To learn the concepts of *Unsupervised Learning.*
- To understand the concepts of *Neural Networks*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Know the concepts of *Machine Leaning*.
CO2: Understand basics of *Data Pre-processing* and *Feature Selection.*
CO3: Learn *Supervised Learning* and *Regression Algorithms*.
CO4: Learn the concepts of *Unsupervised Learning.*
CO5: Understand the concepts of *Neural Networks*.

UNIT I (12 Hours)

Introduction to Machine Learning: Human Learning and Machine Learning - Types of Machine Learning - Languages and Tools in Machine Learning - Framework for Developing Machine Learning Models - Preparing to Model - Modeling and Evaluation Metrics.

UNIT II (12 Hours)

Basics of Data Preprocessing and Feature Engineering: Feature Transformation - Feature Scaling- Feature Construction and Feature Subset Selection - Dimensionality Reduction - Explorative Data Analysis - Hyper Parameter Tuning - Introduction to SK Learn Package.

UNIT III (12 Hours)

Supervised Learning: Introduction - Classification (Common Cassification Algorithms):Naïve Bayes,KNN, Decision Trees, Random Forest, Support Vector Machines, XGBoost.
Regression(Common Regression Algorithms): Simple Linear Regression and Multiple Linear Regression - Polynomial Regression - Logistic Regression-Regularisation:Lasso and Ridge.

UNIT IV (12 Hours)

Unsupervised Learning: Introduction - Unsupervised Vs Supervised Learning - Unsupervised Learning Models - Dimensionality Reduction - Clustering : Association Rule Mining - Applications of Unsupervised Learning.

UNIT V (12 Hours)

Introduction to Neural Networks: Artificial Neural Networks - Hand Digit Classification - Convolution Neural Networks - Image Classification - Hyper Parameter Tuning - Recurrent Neural Networks - Building Recurrent NN - Long Short Term Memory.

Reference Text Books:

1. Hastie, T., R. Tibshirani, and J. H. Friedman. , *The Elements of Statistical Learning: Data Mining, Inference and Prediction,* New York, NY: Springer, 2011, ISBN: 97803879
2. EthemAlphaydin, An introduction to Machine Learning, PHI Learning Private Limited, 2020
3. AurelienGeron, Hands-On Machine Learning with Scikit Learn, Keras and Tensor Flow, O'REILY -2019
4. Tom Mitchell, Machine Learning, Tata McGraw Hill, 2013
5. Francois Chollet, Deep Learning with Python, Manning , 2019

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc(Computational Data Science)., Second Semester

Course Name: Machine Learning

Course Code: 22DS2T2

(w.e.f admitted batch 2022-23)

Time: 3 Hours **Max Marks: 70 Marks**

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1.(a) Define *Machine Learning* and list different *Machine Learning Techniques*. (CO1, L1)

(or)

(b) What are the *different tools* used in Machine Learning? (CO1, L1)

2. (a) What are the techniques of *Feature Scaling*? (CO2, L1)

(or)

(b) Define *Dimensionality Reduction* and explain its Techniques. (CO2, L1)

3. (a) What are the various algorithms used for *Classification*? (CO3, L1)

(or)

(b) Define *Logistic Regression*. (CO3, L1)

4. (a) Explain *Clustering* and list out different *Clustering Algorithms*? (CO4, L2)

(or)

(b) Explain the Applications of *Unsupervised Learning*? (CO4, L2)

5. (a) List some commercial practical applications of *Artificial Neural Networks*.(CO5, L1)

(or)

(b) Define *Hyper Parameter Tuning* with example. (CO5, L1)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6. (a) Explain the *work flow* in Machine Leaning Problem Solving. (CO1, L2) 10 Marks

(or)

(b) Explain *Supervised* and *Unsupervised Learning* with Examples. (CO1, L2) 10 Marks

7. (a) Discuss *Feature Transmission* in detail. (CO2, L6) 10 Marks

(or)

(b) Discuss *Feature Subset Selection* and its Application. (CO2, L6) 10 Marks

8. (a) Explain *Classification Problem* in Supervised Learning and Explain *Decision Tree Algorithm* for Classification. (CO3, L5) 10 Marks

(or)

(b) Explain *Linear and Multiple Linear Regression* in Python Library Stats Models. (CO3, L5) 10 Marks

9. (a) Apply *K-Means Clustering Algorithm* on following X and Y values (10,34), (45,55), (23,55), (14,66), (56,25),(12,16),(14,25). (CO4, L3) 10 Marks

(or)

(b) Choose suitable Algorithm in SK-Learn Package to perform *Hierarchical Clustering*. (CO4, L3) 10 Marks

10. (a) List basic features in Neuron and different types of *Activation Functions*. (CO5, L4) 10 Marks

(or)

(b) List various parameters of *Convolution Neural Networks.* (CO5, L4) 10 Marks