III- Year I- Semester	Name of the Course	L	T	P	C
PE3101	**Artificial Neural Networks** **(Professional Elective - 1.1)**	2	0	2	3

Course Objectives:

1. To learn data processing and cleaning
2. To understand mathematical model of artificial neuron
3. To learn various activation functions used in neural network
3. To understand training and learning process in neural networks
4. To implement neural network models using python

Syllabus:

Unit-1: Foundations

Linear Algebra- Creating matrices add vectors using NumPy, implementation of operations on matrices-addition, subtraction, multiplication, transpose, inverse, determinant, Vectors- addition, subtraction, dot product, various norms. Linear transformations, pre-processing data using pandas. Scikit Learn-data processing, creating model using scikit-learn.

Unit-2: Introduction to Artificial Neural Network

Biological Model of Neuron, ANN model, McCulloch and Pitts model, Adaline, Perceptron, Activation functions, realizing logic gates using perceptron, implementing perceptron using Python, implementing functionality of logic gates using perceptron in python.

Unit-3: Single Layer Perceptron

Architectural Models for ANN, Single Layer Perceptron Perceptron as a classifier, implementing classification using perceptron, Learning and training ANN, optimization- Gradient descent algorithm, stochastic gradient descent algorithm, implementation of gradient descent using python.

Unit-4-Multilayer Perceptron

Multilayer Perceptron- architecture, functionality of neurons in different layers, implementing multilayer perceptron using scikit-learn, Back propagation algorithm-training and convergence, design issues, example, implementation using python.

Unit-5- Linear, Logistic regression and Classification

Linear and logistic regression using MLP, multivariate regression, implementation of linear and logistic regression using scikit-learn, Function Approximation using MLP, RBF networks, RBF Training. Implementation of classification using ANN with scikit-learn on IRIS dataset.

. **Text Books:**

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.
3. Pradhan Manaranjan , U Dinesh Kumar,"Machine Learning Using Python" , wiley.

References:

1. Yegna narayana B,"Artificial Neural Networks", PHI Learning Pvt. Ltd, 2009.
2. Martin T. Hagan, Howard B. Demuth, Mark Hudson Beale, Orlando De Jesús, Neural