Code	Soft Computing I	2 Hours/Week	2 Units

Contents of Syllabus	Hours
Soft Computing Concepts What Is Soft Computing? Definitions, Goals, and Importance Soft Computing versus Hard Computing Soft-Computing Systems	2
Machine Learning: What Is Machine Learning, Historical Database Data Acquisition, Pattern Matching	2
Soft Computing Techniques: Neural Networks, Genetic Algorithms, Fuzzy Logics, Hybrid systems	2
Nature and Goals of Neural Computing: Overview of network architectures and learning paradigms, Historical Note, The Biological Neuron, The Artificial Neuron, Structure, The Processing of the Neuron, The Perceptron	4
Multilayer Perceptron: Layers, Weights, Activation Functions, Feed-Forward Neural Network **Modeling the Problem:** Functional Prediction, Classification, Normalization, the Problem of Nonlinear Separability, Bias, **Training:** Types of Learning, The Stages of Supervised Learning, Error Function, Epoch, Learning Rate, Variable Learning Rate, Momentum, Stopping Condition, Back Propagation Algorithm, Steepest Descent Approach, Mathematical Analysis of the BPA Expression	4
Types of Artificial Neural Networks: Unsupervised Learning, Reinforcement Learning **Radial Basis Function Network:** Concept, Network Architecture, Mathematical Analysis, Training.	4
Self-Organizing Maps: Concept, Architecture, Mathematical Analysis, Training. **Learning Vector Quantization:** Concept, Architecture, Mathematical Modeling, Training	4
Recurrent Neural Network: Concept, Architecture, Training **Hopfield Neural Network:** Concept, Architecture, Mathematical Modeling, Training, Introduction, Jordan Network, , Elman Network **Adaptive Resonance Theory:** Concept, Architecture, Training,	4
Principal Component Analysis Neural Networks and its Applications: Dimensionality Reduction. What are Principal Components? Computing the Components, Why the Eigenvectors? PCs, Variance and Least-Squares. Eigenfilter	4

Textbook:

1. **Soft Computing: Fundamentals and Applications, D. K. Pratihar, 2016**
2. **Introduction to Soft Computing, Eva Volna, 2013**