**CS010 805G02 :Neural networks**

**Module 1 (14 hours)**

Biological Neurons and Neural Networks, Basic Structures and Properties of Artificial Neural Networks, Basic Neuron Models-McCulloch-Pitts -Nearest Neighbour- Radial Basis Function, Activation Functions ,Singe Layer Perceptrons-Linear Seperability, Learning and Generalization in Single Layer Perceptron-Hebbian Learning-Gradient Descent Learning-Widrow-Hoff Learning-The Generalized Delta rule, Practical Considerations

**Module 2 (12 hours)**

Multi Layer Perceptron Learning,Back Propogation Algorithim -Applications – Limitations– Network Paralysis – Local Minima – Temporal Instability, Pattern Analysis Tasks- ClassificationRegression-Clustering, Pattern Classification and Regression using Multilayer Perceptron.

**Module 3 (10 hours)**

Radial Basis Function Networks: Fundamentals, Algorithms and Applications, Learning with Momentum, Conjugate Gradient Learning, Bias and Variance. Under-Fitting and Over-Fitting, Stochastic neural networks, Boltzmann machine.

**Module 4 (12 hours)**

Network based on competition:- Fixed weight competitive Network-Maxnet, Mexican Hat and Hamming Net, Counter Propagation Networks- Kohonen's self-organizing map – Training the Kohonen layer – Training the Grossberg layer – Full counter propagation network – Application, Adaptive resonance theory – classification- Architecture – Learning and generalization.

**Module 5 (12 hours)**

Pattern Association: - training algorithm for pattern association - Hetro Associative Network, Auto Associative Network, Architecture of Hopfield nets – stability analysis ,General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM training algorithms.

**References**


1. B. Yegnanarayana, "Artificial Neural Networks", PHI.
2. Simon Haykin, Neural Networks, 2/e, Prentice Hall
3. Neural Computing & Practice – Philip D. Wasserman
4. Neural Networks in Computer Intelligence-Limin Fu,Tata Mc.Hill Edition