EC7T4C   **Artificial Neural Networks**   **Credits: 4**

Lecture : 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks** -------
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Course Objectives:

- To introduce the fundamentals of Artificial Neural Networks and their applications.
- To introduce the supervised and unsupervised learning models of ANN.
- To introduce the concept of Evolutionary Optimization.

Learning Outcomes:
- Students are aware of the working of the biological neural network & the artificial neural network.
- Students will be able to apply the principles of artificial neural network in the fields of image processing, pattern recognition & solving optimization problems.

UNIT- I
Introduction To Artificial Neural Networks : Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

UNIT- II
Fundamental Models Of Artificial Neural Networks : Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or LeastmeanSqure (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

UNIT- III
Feed Forward Networks : Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem, Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT- IV
Adaline And Madaline Networks : Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

UNIT- V

Counter Propagation Networks : Winner Take – all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

Unit-VI

Associative Memory Networks - I : Types, Architecture, Continuous and Discrete Hopfield Networks, Energy Analysis, Storage and Retrival Algorithms, Problems with Hopfield Networks.

UNIT- VII

Associative Memory Networks – II: Boltzman Machine, Bidirectional Associative Memory, Adaptive Resonance Theory Networks Introduction, Architecture, Algorithm.

UNIT-VIII

Applications Of Neural Networks : Implementation of A/D Converter using Hopfield Network, Solving Optimization Problems, Solving Simultaneous Linear Equation, Solving Traveling Salesman Problems using Hopfield Networks, Application in Pattern Recognition, Image Processing.

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Learning Resources

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Text Books:

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition,1992
2. Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH,2006

References:

1. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International, 2001
2. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Edition.,2008
3. Fundamental of Neural Networks – LaureneFausett, Pearson, 1st Edition.,1994
4. Artificial Neural Networks - B. Yegnanarayana, PHI, 2006