MMA-E316

NEURAL NETWORKS

MM : 100 Sessional : 30
Time : 3 hrs ESE : 70
L T P Pass Marks : 40
5 2 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Introduction: Some examples and applications of neural computation, History of artificial neural systems development. Fundamental concepts: Biological neurons and their artificial models, Models of artificial neural networks, Neural processing, Learning and adaption, Neural network learning rules- Hebbian learning rule, Perceptron learning rule, Delta learning rule, Widrow-Hoff learning rule, Winner-take-all learning rule, Outstar learning rule.

Single-Layer feed forward networks: Classification model, Features and Decision regions. Discriminant functions. Linear machine and minimum distance classification. Non-parametric training concept. Training and classification using the discrete perceptron. Single-layer continuous perceptron networks. Multicategory single-layer perceptron networks.

Multilayer Feedforward Networks: Linearly nonseperable pattern classification, Delta learning rule for multiperceptron layer. Generalized delta learning rule. Feedforward recall and error back-propagation training. Learning factors-initial weights, cumulative weight adjustments versus incremental updating, steepness of the activation function, learning constant, momentum method, network architecture versus data representation, necessary number of hidden neurons, Classifying and expert layered networks. Functional link networks.

Single-layer Feedback Networks: Basic concepts of dynamical systems. Discrete-time Hopfield networks, Gradient-type Hopfield networks. Associative Memories: Basic concepts. Linear associator. Recurrent associative memory-concepts and performance analysis. Bidirectional associative memories.

Matching and self-Organizing Networks: Hamming Net and MAXNET. Unsupervised learning of clusters. Conuterpropagation network. Feature mapping. Self-organizing maps, Cluster discovery network (ART1). Brief study of other applications.

Text /Reference Books

1. J.M. Zurada, Introductin to Artificial Neural Systems, Jiaco Publishing House
2. K. Gurney, An Introductin to Neural Networks, UCL Press
3. L. Perlov, Differential equations and Dynamic Systems, Springer Publication.