

**ELECTIVE COURSE IV- 4 -PATTERN RECOGNITION**

**Unit I**

Introduction and Bayesian Decision Theory-Introduction to pattern recognition, Systems, design cycles, learning and adaptation, Bayesian decision theory, minimum error-rate classification, classifiers, discriminant functions and decision surfaces.

**Unit II**

Maximum – Likelihood and Bayesian parameter estimation - Maximum – Likelihood estimation, Bayesian estimation, Bayesian parameter estimation, Gaussian case and general theory, problems of dimensionality, Hidden Markov models.

**Unit III**

Nonparametric Techniques - Density estimation, parzen windows,  $K_n$  – Nearest neighbour, estimation, The nearest neighbour rule, metrics and nearest – neighbour classification, fuzzy classification, approximation by series expansions.

**Unit IV**

Linear Discriminant functions - Linear discriminant functions and decision surfaces, generalized linear discriminant functions, The two category uncorrelated separate case, minimizing the perception criterion function, relaxation procedures, nonreversible behaviour, Minimum squared-error procedures, The Ho – Kashyap Procedures, support vector machines, multicategory generalization.

**Unit V**

Multilayer Neural Networks - Feed forward operations and classifications, back propagation algorithm, error factors, back propagation as feature & mapping, back propagation, Bayesian theory and probability, practical techniques for improving back propagation, regularization, complexity adjustment and pruning.

**Text / Reference Books:**

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification" 2nd Edition, John Wiley
2. John Hertz, Andres Krogh & Richard G. Palmer, "Introduction to the theory of Neural Computation", Addison Wesley