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| Hours / Week | : | 4 | |  | Sessional Marks | : | 40 |
| Credits | : | 4 | |  | End Examination Marks | : | 60 |

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| **UNIT – I** |
| **Introduction**: History of neural networks, Human Brain, models of a neuron, neural networks viewed as Directed graphs, Feedback, network architectures.  **Learning process**: Error correction learning, memory–based learning, Hebbian learning, competitive learning, Boltzmann learning. |
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| **UNIT – II** |
| **Single layer perceptron**: Adaptive filtering problem, unconstrained optimization techniques, linear least squares filters, least mean square algorithm, learning curves, perceptron convergence theorem.  **Multi-layer perceptron**: Multi-layer perceptron-back propagation algorithm, XOR Problem, output representation and decision rules, Network pruning techniques. |
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| **UNIT – III** |
| **Radial Basis Function Networks**: Introduction, cover’s Theorem on the Separability of Patterns, Interpolation problem, supervised learning as an III – Posed Hyper surface Reconstruction problem, Regularization Networks, Generalized Radial Basis Function Networks, XOR Problem (revised), Approximation properties of RBF Networks. |
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| **UNIT – IV** |
| **Support vector machines**: Introduction, optimal hyper plane for linearly separable patterns, optimal hyper plane for non-separable patterns, SVM for pattern recognition, SVM for non-linear regression.  **Committee machines**: introduction, boosting, learning strategies for the HME model, EM algorithm, application of the EM algorithm to the HME model. |
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| **UNIT – V** |
| **Fuzzy sets, fuzzy systems, and applications**: Fuzzy set, Membership functions, Geometry of fuzzy sets, simple operations on fuzzy sets, fuzzy rules for Approximation Reasoning, Defuzzyfication, fuzzy engineering, and applications. |
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| TEXT BOOKS |
| 1. Neural networks – A Comprehensive Foundation by Simon Haykin – Second Edition – Pearson Education. 2. Neural networks- A class room approach -Satish Kumar-TMH (Unit-V) |
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| REFERENCE BOOKS |
| 1. An Introduction to fuzzy Control, by D.Driankov, H.Hellen Doorn, M.Reinfrank, Naraosa Publishing House. 2. Essential of Fuzzy Modelling and Control, R.K. Yager, D.P.Filev, John Willey & Sons, Inc NY 1994 |