

## SOFT COMPUTING

**Course Code** 12IS5A2  
**L:T:P:S** 3:0:0:1  
**Credits** 4

**CIE Marks** 100  
**SEE Marks** 100  
**SEE Duration** 3 Hrs

### Unit-I

#### **Neural Networks**

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture **6 Hrs**

### Unit-II

#### **Learning Processes**

Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks. **7 Hrs**

### Unit-III

#### **Fuzzy Logic**

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. **6 Hrs**

### Unit-IV

#### **Operations on Fuzzy Sets, Fuzzy Arithmetic, Fuzzy Logic, Uncertainty based Information**

Complement, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Information & Uncertainty, Non specificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. **7 Hrs**

### Unit-V

#### **Introduction of Neuro-Fuzzy Systems**

Architecture of Neuro Fuzzy Networks, Applications of Fuzzy Logic: Medicine, Economics etc. **7 Hrs**

#### **Genetic Algorithms**

An Overview, Genetic Algorithms in problem solving, Implementation of Genetic Algorithms

### Course Outcome

- 1** Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
- 2** Analyze genetic algorithms to combinatorial optimization problems
- 3** Develop neural networks to pattern classification and regression problems
- 4** Effectively use existing software tools to solve real problems using a soft computing approach
- 5** Evaluate and compare solutions by various soft computing approaches for a given problem.

### **References**

- 1** Anderson, James a., An Introduction to Neural Networks, ISBN: 978-81-203-1351-4,phi, 2008
- 2** Hertz J. Krogh, R.G. Palmer - Introduction to the Theory of Neural Computation, Addison-Wesley, 1991.ISBN 9780201515602
- 3** G.J. Klir& B. Yuan - Fuzzy Sets & Fuzzy Logic, PHI, 2006, ISBN: 978-81-203-1136-7
- 4** Melanie Mitchell - An Introduction to Genetic Algorithm, PHI, 2006

### **Scheme of Continuous Internal Evaluation for Theory**

CIE consists of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best two will be considered. In addition 10 marks to be earned through assignment or seminar on emerging topics.

### **Scheme of Semester End Evaluation—Theory**

- 1.** Question No. 1 consisting of objective type/short type questions, it is compulsory and it carries 20 marks, covering the entire syllabus.
- 2.** There are five units. Each unit will have two questions of 16 marks each, students have to answer one question from each unit.