



**BIT 457**

**SOFT COMPUTING**

### **UNIT-I**

**Fuzzy Sets and Fuzzy Logic:** Introduction to Classical Sets and Fuzzy Sets. Classical set and Fuzzy sets – Operations and Properties. Fuzzy Relations – Equivalence & Tolerance. Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion. Lambda Cuts for Fuzzy Sets and Fuzzy Relations, Defuzzification Methods. Fuzzy Arithmetic. Fuzzy Logic and Approximate Reasoning. Rule Based Systems and Graphical Techniques of Inference. Fuzzy Associative Memories.

### **UNIT-II**

**Rough Sets and Granular Computation:** Rough Sets – Definition, Upper and Lower Approximations, Boundary Region, Decision Tables and Decision Algorithms. Properties of Rough Sets. Rough Set Model based on Tolerance Relation. Introduction to Multi-Granulation Rough Set Models.

### **UNIT-III**

**Genetic Algorithms:** Introduction to Genetic Algorithms, Basic Operators, Terminology and Mathematical Foundations. Computer Implementation of a Genetic Algorithm. Some Applications of Genetic Algorithms. Advanced Operators and Techniques in Genetic Search. Genetic Algorithms based Systems.

### **UNIT-IV**

**Artificial Neural Networks:** Introduction, Learning Processes, Single Layer Perceptrons, Multilayer Perceptrons, Radial-Basis Function Networks, Support Vector Machines, Self-Organizing Maps. Artificial Neural Networks based Systems.

### **UNIT-V**

Systems and Applications: Fuzzy Systems and Applications. Rough Set based Granular Systems and Applications. Genetic Algorithms based Systems and Applications. Artificial Neural Networks and Applications. Hybrid Systems and Applications.

#### **Suggested Reading:**

1. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill, 1997.
2. Zdzislaw Pawlak, “Rough Sets”, Institute of Theoretical and Applied Informatics, Polish Academy of Sciences, University of Information Technology and Management, Poland.  
[bcpw.bg.pw.edu.pl/Content/2026/RoughSetsRep29.pdf](http://bcpw.bg.pw.edu.pl/Content/2026/RoughSetsRep29.pdf)
3. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Pearson

Education, 1989.

4. Simon Haykin, "Neural Networks: A Comprehensive Foundation", Pearson Education, 2001
6. Lech Polkowski, Shusaku Tsumoto, Tsau Y. Lin, Editors, "Rough Set Methods And Applications", Springer, 2000.
7. Bargiela Andrzej and Witold Pedrycz, "Granular Computing – An Introduction", Springer, 2003.
8. Witold Pedrycz (Editor), Andrzej Skowron (Co-editor), Vladik Kreinovich (Co-editor), "Handbook of Granular Computing", Wiley Publications, July 2008.

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