

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II			
Subject Code & Name	Instructions Hours per Week			Credits			
AM2EM2: Soft Computing Techniques	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective: To introduce the basic notions and study the techniques of Fuzzy Mathematics, neural network and genetic algorithm.

Prerequisites: Set theory, algebra of functions.

COURSE OF CONTENTS

UNIT I

Crisp sets, Fuzzy sets and their basic concepts, operations on fuzzy sets, Fuzzy arithmetic, Fuzzy relations, Fuzzy relation equations based on sup – i composition and on Inf – wi composition.

UNIT II

Fuzzy measure, Evidence theory, Possibility theory, Fuzzy sets and possibility theory.

UNIT III

Fuzzy logic, Classical logic, Multivalued logic, Fuzzy propositions, Fuzzy quantifiers, inference from conditional fuzzy propositions. Methods of construction : An overview – Direct methods with one expert – Direct method with multiple experts – Indirect method with multiple experts and one expert – Construction from sample data, Defuzzification, Fuzzy Controllers and their applications.

UNIT IV

Basic concepts, Model of artificial neural Network (ANN), Neural Network architectures, learning methods, Back propagation networks, architecture of back propagation networks, Associative memory, Auto correlators, Adaptive resonance theory, Introduction to ART1 and ART2, Applications.

UNIT V

Fundamentals of Genetic Algorithms (GAs), history, basic concepts and biological background, working principle, encoding, fitness function, reproduction, Genetic modeling, various operators, crossover and mutation, convergence of Genetic Algorithm, Applications.

BOOKS RECOMMENDED:

- [1] Rajsekaran, G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy logic and Genetic Algorithms: Synthesis and Applications, PHI, New Delhi, 2005.
- [2] G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
- [3] H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
- [4] David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] B. Kosko, Neural networks and fuzzy systems, Prentice-Hall, 1993.
- [6] A.K. Bhargava, Fuzzy Set theory, Fuzzy Logic and their Applications, S. Chand & Co. Pvt. Ltd., New Delhi, 2013.