

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA503	Soft Computing	3	1	--	3	1	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	Discrete Mathematics, Probabilities and Statics
Course Outcomes	Students will be able to
	<b>CO1</b> Classify the fundamental components of wireless communication.
	<b>CO2</b> Interpret techniques used for medium access in wireless communication.
	<b>CO3</b> Classify technical details of telecommunication and aspects of Wireless LAN.
	<b>CO4</b> Analyze the concept of Mobile Network Layer and Mobile Transport Layer.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		<b>Introduction to Soft Computing: —</b>	1	2
	1.1	Evolution of Computing - Soft Computing Constituents		
	1.2	From Conventional AI to Computational Intelligence		
	1.3	Machine Learning Basics		
2		<b>Artificial Neural Network</b>	1	6
	2.1	<b>Introduction</b> , Fundamental Concept, Artificial Neural Network Biological Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer), Evolution of Neural Networks		
	2.2	Basic Models of Artificial Neural Network, <b>Supervised Learning Network</b> - Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons,		
	2.3	Back-Propagation Networks, backpropagation learning methods effect of learning rule co-efficient, back propagation algorithm factors affecting back propagation training		
	2.4	Associative Memory Networks, Unsupervised Learning Networks, Special Networks		
3		<b>Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets</b>	1	3
	3.1	Introduction to Fuzzy Logic		
	3.2	Classical Sets (Crisp Sets)		
	3.3	Fuzzy Sets		
4		<b>Classical Relations and Fuzzy Relations</b>	1	4
	4.1	Introduction		
	4.2	Cartesian Product of Relation		

	4.3	Classical Relation, Fuzzy Relations		
5		<b>Membership Functions:</b>	1, 2	3
	5.1	Introduction, Features of the Membership Functions		
	5.2	Fuzzification		
	5.3	Methods of Membership Value Assignments		
6		<b>Defuzzification:</b>	1, 2	3
	6.1	Introduction		
	6.2	Lambda-Cuts for Fuzzy Sets (Alpha-Cuts) LambdaCuts for Fuzzy Relations		
	6.3	Defuzzification Methods		
7		<b>Fuzzy Arithmetic and Fuzzy Measures:</b>	1	4
	7.1	Introduction, Fuzzy Arithmetic- Interval Analysis of Uncertain Values Fuzzy Numbers		
	7.2	Fuzzy Ordering, Fuzzy Vectors Extension Principle		
	7.3	Fuzzy Measures- Belief and Plausibility Measures, Probability Measures Possibility and Necessity Measures		
	7.4	Measures of Fuzziness, FuzzyIntegrals		
8		<b>Fuzzy Rule Base and Approximate Reasoning:</b> , ,	1, 2	4
	8.1	Introduction, Truth Values and Tables in Fuzzy Logic Fuzzy Propositions		
	8.2	Formation of Rules, Decomposition ofRules (Compound Rules) Aggregation of Fuzzy Rules		
	8.3	Fuzzy Reasoning (Approximate Reasoning)- Categorical Reasoning, Qualitative Reasoning, Syllogistic Reasoning Dispositional Reasoning		
	8.4	Fuzzy Inference Systems (FIS)- Constructionand Working Principle of FIS, Methods of FIS, Overview of Fuzzy Expert System		
9		<b>Fuzzy Decision Making:</b>	1	3
	9.1	Introduction, Individual Decision Making Multi-person Decision Making, Multi-objective Decision Making Multi-attribute Decision Making, Fuzzy Bayesian Decision Making		
	9.2	<b>Fuzzy Logic Control Systems:</b> - Introduction, Control System Design		
	9.3	Architecture and Operation of FLC System, FLC System Models Application of FLC Systems		
10		<b>Genetic Algorithm</b>	1	4
	10.1	Basic concepts, :, Difference between genetic algorithm and traditional methods, Simple genetic algorithm		
	10.2	Similarity templates, Workingprinciple, Procedures of GA		
	10.3	Genetic operators- reproduction, Mutation, crossover, basic building block hypothesis		
	10.4	the two-armed and k-armed bandit problem, Minimal deceptive problem, Applications		
11		<b>Applications of Soft Computing</b>	1, 2,3	9

11.1	Introduction, A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Radar) Image for Flood Area- Image Fusion		
11.2	Neural Network Classification, Methodology and Result		
11.3	Optimization of Traveling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithms, Schemata, Problem Representation, Reproductive Algorithms, Mutation Methods, Results		
11.4	Genetic Algorithm-Based Internet Search Technique- Genetic Algorithms and Internet,		
11.5	First Issue: Representation of Genomes, Second Issue: Definition of the Crossover Operator, Third Issue: Selection of the Degree of Crossover		
11.6	Fourth Issue: Definition of the Mutation Operator, Fifth Issue: Definition of the Fitness Function, Sixth Issue: Generation of the Output Set		
11.7	Soft Computing Based Hybrid Fuzzy Controllers- Neuro-Fuzzy System		
11.8	Real-Time Adaptive Control of a Direct Drive Motor, GA-Fuzzy Systems for Control of Flexible Robots GP-Fuzzy Hierarchical Behavior Control, GP-Fuzzy Approach, Soft Computing Based Rocket Engine Control- Bayesian Belief Networks		
11.9	Fuzzy Logic Control, Software Engineering in Marshall's Flight Software Group, Experimental Apparatus and Facility Turbine Technologies SR-30 Engine, System Modifications Fuel-Flow Rate Measurement System, Exit Conditions Monitoring		
<b>Total</b>			<b>45</b>

### References:

- [1] Dr. S. N. Sivanandam and Dr. S. N. Deepa, "Principles of soft computing" John Wiley
- [2] S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.
- [3] N.P. Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.
- [4] Siman Haykin, "Neural Networks" Prentice Hall of India
- [5] Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
- [6] Kumar Satish, "Neural Networks" Tata McGraw Hill