Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCAE45 B	Soft Computing	3	--	--	3	--	--	3
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes	Artificial Intelligence	
Course Outcomes	Student will be able to	
	CO1	To distinguish different architectures of artificial Neural Network based on learning methods.
	CO2	To apply fuzzy logic to design control system
	CO3	To understand and apply genetic algorithm for various application
	CO4	To analyze real time application by using hybrid method

Module No.	Unit No.	Topics	Ref.	Hrs.
1		**Soft Computing**	1	2
	1.1	Hard computing Vs Soft Computing,		
	1.2	Soft computing constituents – ANN, Fuzzy Logic, GA Applications of Soft Computing		
2		**Artificial Neural Network**	1,2	6
	2.1	Introduction, Fundamental Concept, Artificial Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron, Basic Models of Artificial Neural Network		
	2.2	Supervised Learning Network-Linear Separability, Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network.		
	2.3	Unsupervised Learning Networks- MaxNet		
3		**Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets**	1,2,3	22
	3.1	Introduction to Fuzzy Logic,		
	3.2	Classical Sets (Crisp Sets),Fuzzy Sets		
	3.3	Classical Relations and Fuzzy Relations		
		Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations		
	3.4	Membership Functions		
		Introduction, Features of the Membership Functions,		
		Fuzzification, Methods of Membership Value Assignments		
	3.5	Defuzzification		
		Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts),		

		Lambda-Cuts for Fuzzy Relations,		
		Defuzzification Methods		
	3.6	Fuzzy Inference System:		
		Truth Values and Tables in Fuzzy Logic,		
		Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules),		
		Aggregation of Fuzzy Rules,		
		Fuzzy Inference Systems (FIS)- Construction and Working Principle of FIS, Methods of FIS,		
		Overview of Fuzzy Expert System		
		Case study based on Fuzzy expert System		
4		**Genetic Algorithm**	1,2	5
	4.1	Basic concepts, Difference between genetic algorithm and traditional methods,		
	4.2	Simple genetic algorithm, Working principle,.		
	4.3	Procedures of GA, Genetic operators- reproduction, Mutation, crossover		
5		**Hybrid Soft computing Techniques**	1,2	4
	5.1	Neuro fuzzy hybrid system		
	5.2	Genetic neuro hybrid system		
6		**Application of Soft computing**	1,2	3
	6.1	Soft computing based hybrid fuzzy controller		
	6.2	Soft computing based rocket engine control		
			Total	**42**

References:

[1] Anandita Das, "Artificial Intelligence and Soft Computing for Beginners", Shroff Publication.

[2] Dr. S. N. Sivanandam and Dr. S. N. Deepa, "Principles of Soft Computing", John Wiley

[3] S. Rajsekaran& G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications", Prentice Hall of India.

[4] Kumar Satish, "Neural Networks", Tata McGraw Hill

[5] Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley India.

[6] David E. Goldberg, "Search, Optimization & Machine Learning", TBS (1989), First edition