

C. Syllabus Detailing and Learning objectives

Module	Chapter	Detailed Content	Syllabus Detailing	Learning Objectives
Module 1	CH 1 Introduction to Soft Computing	Soft computing Constituents, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation.	 Purpose: To make students understand the concept of soft computing. To study Concepts of Learning and Adaptation. Scope – 1. Academic Aspects- Understanding terminology commonly used in soft computing, such as <i>fuzzy set</i> and neural network and describe Constituents. 2. Technology Aspect- Difference between Hard Computing and Soft Computing. . 3. Application Aspect- For a real problem decide the suitable Constituents of soft computing 	 To understand and Comprehend various constituents of soft computing(R) To Compare and contrast soft and hard computing. (U)
	011.0		Students Evaluation – 1. Theory Questions to be asked on soft computing, 2.Viva on difference between soft and hard computing.	
2 2	CH 2 Neural Networks	2.1 Basics of Neural Networks: Introduction to Neural Networks, Biological Neural Networks, McCulloch Pitt model, 2.2 Supervised Learning algorithms: Perceptron (Single Layer, Multi layer), Linear separability, Delta learning rule, Back Propagation algorithm	 Purpose – to understand the difference between learning and programming and explore practical applications of Neural Networks (NN). Scope – 1. Academic Aspects- Understanding the concept artificial neural network. 2. Technology Aspect- McCulloch Pitt model, supervised and unsupervised Learning rules 3. Application Aspect- To develop different learning rules and analyze its behavior. Students Evaluation Questions on different Learning Rules Lab Experiment based on Learning Rules. Corresponding viva questions based on learning rules 	 Classify and compare different learning rules(AN) Design and develop learning rules to identify its behavior. (C) Measure the performance of learning rules.(E) Design and Apply Supervised learning model for perceptron layer.(A)



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		2.3 Un-Supervised Learning algorithms: Hebbian Learning, Winner take all, Self Organizing Maps, Learning Vector Quantization.		 5. Contrast between the major learning models.(U) 6. Analyze the efficiency of supervised and unsupervised learning algorithms also describe the application for which learning rule is useful. (R)
Module 3	Chapter 3 Fuzzy Set Theory	3.1 Classical Sets and Fuzzy Sets, Classical Relations and Fuzzy Relations, Properties of membership function, Fuzzy extension principle, Fuzzy Systems- fuzzification, defuzzification and fuzzy controllers.	 Purpose- This chapter introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience. Scope – 1. Academic Aspects Student will study Fuzzy logic and its applications in detail 2. Technology Aspect- Study Properties and operations on fuzzy sets. Design fuzzy controllers. 3. Application Aspect- Students should understand fuzzy set and fuzzy relation to design fuzzy systems. Students Evaluation – 1. Theory questions based on Fuzzy sets relations 2. Lab experiment based on design of fuzzy controller. 3. Viva questions based on fuzzy systems. 	 Analyze and appreciate the applications which can use fuzzy logic. (AN) Design and apply fuzzification and defuzzification methods to design fuzzy controllers.(A) Analyze the problem to identify the fuzzy membership functions for real world problem. (U)
Module 4	Chapter 4 Hybrid system	4.1 Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System(ANFIS).	Purpose- To design an Neuro fuzzy inference system with the learning of Neural and fuzzy Scope - 1. Academic Aspects- Student will study CANFIS , ANFIS architecture 2. Technology Aspect- Modularity of some real life example like washing machine , hot water problem 3. Application Aspect- Real life application of washing machine , Train speed etc	 Classify and compare ANFIS and CANFIS (AN) Design and develop FIS architecture (C) Measure the performance different application (E)



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			Students Evaluation – 1 Able to explain different architecture of hybrid system 2. Evaluate different problem like washing machine , train , hot water problem	 4. Design and Apply CANFIS and ANFIS as solution of Soft Computing .(A) 5. Contrast both architecture (U)
Module	Chapter 5 -	5.1 Derivative based	Purpose –	Classify and compare derivative based and
5	Introduction to Optimizatio n Techniques	optimization- Steepest Descent, Newton method. 5.2 Derivative free optimization- Introduction to	Designing the steps how to optimized the steps of neural computing either using Derivative based or derivate free method Scope – 1. Academic Aspects- Student will study the Newton method, steeps descent	derivative free technique (AN) 2. Implement Newton method , steeps descent method (C)
		Evolutionary Concepts.	Student will study the Newton method , steeps descent method 2. Technology Aspect- Optimizing the neural method through matlab programming 3. Application Aspect- Optimizing of different method Student Evaluation - 1. List the factors for successful optimization 2. List the hardware and network requirement	3. Measure the performance different method (E)
			3. Analysis of different method for optimization	Newton method , steeps descent method
Module 6	Chapter 6 - Genetic Algorithms and its	Inheritance Operators, Cross over types, inversion and Deletion, Mutation	Purpose – Application of Genetic algorithms for soft computing application	1 Describe genetic algorithm summarize their steps compare with traditional method (R)
	applications	Operator, Bit-wise Operators, Convergence of GA, Applications of GA	Scope – 1. Academic Aspects- To study genetic algorithms and its application	 2. Comprehend basic consideration for designing soft computing application (U) 3. Summarize the features genetic



2. Technology Aspect- Implementing genetic algorithm for soft computing application	algorthim . <mark>Design, Develop</mark> genetic Algorthim. (AN)
 3. Application Aspect- Implementing Genetic algorithm for neural base application Student Evaluation - Listing steps of genetic algorithm Analysis the steps of genetic algorithm Implementing using example 	5. Synthesize Application of soft computing using genetic algorithm . (C)