Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPE7025	Elective-IISoft Computing	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			

Pre-requisite Course Codes		Programming Languages (C, C++, Java) Basic Mathematics
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Identify the various characteristics of soft computing techniques.
	CO2	Apply the supervised and unsupervised learning algorithm for real world applications.
	CO3	Apply &design fuzzy controller system.
	CO4	Appreciate the importance of optimizations and its use in computer engineering fieldsand other domains.
	CO5	Understand the efficiency of a hybrid system and how Neural Network and fuzzylogic can be hybridized to form a Neuro-fuzzy network and its various applications.

Module No.	Topics	Ref.	Hrs.
1	**Introduction to Soft Computing** Soft computing Constituents, Characteristics of NeuroComputing and Soft Computing, Difference between HardComputing and Soft Computing, Concepts of Learning andAdaptation.	1-9	**04**
2	**Neural Networks** Basics of Neural Networks: Introduction to Neural Networks, Biological NeuralNetworks, McCulloch Pitt model, Supervised Learning algorithms: Perceptron (Single Layer, Multilayer), Linear separability,Delta learning rule, Back Propagation algorithm, Un-Supervised Learning algorithms: Winner take all, Self- Organizing Maps, Learning VectorQuantization.	1-9	**14**
3	**Fuzzy Set Theory** Classical Sets and Fuzzy Sets, Classical Relations and FuzzyRelations, Properties of membership function, Fuzzyextension principle, Fuzzy Systems- fuzzification,defuzzification and fuzzy controllers.	1-9	**14**
4	**Hybrid system** Introduction to Hybrid Systems, Adaptive Neuro FuzzyInference System(ANFIS).	1-9	**04**
5	**Introduction to Optimization Techniques**		**06**

	Derivative based optimization- Steepest Descent, Newton method. Derivative free optimization- Introduction to EvolutionaryConcepts.		
6	**Genetic Algorithms and its applications:** Inheritance Operators, Cross over types, inversion andDeletion, Mutation Operator, Bit-wise Operators,Convergence of GA, Applications of GA.	1-9	**06**
		Total	**48**

References:

[1] Timothy J.Ross "Fuzzy Logic With Engineering Applications" Wiley.

[2] S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.

[3] S.Rajasekaran and G.A.VijayalakshmiPai "Neural Networks, Fuzzy Logic and Genetic Algorithms" PHI Learning.

[4] J.-S.R.Jang "Neuro-Fuzzy and Soft Computing" PHI 2003.

[5] Jacek.M.Zurada "Introduction to Artificial Neural Sytems" Jaico Publishing House.

[6] Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill.

[7] Zimmermann H.S "Fuzzy Set Theory and its Applications" Kluwer Academic Publishers.

[8] Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.

[9] Hagan, Demuth, Beale, "Neural Network Design" CENGAGE Learning, India Edition