ITA6004	Soft Computing	L	T	P	J	C
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Pre-requisite	**Nil**	**Syllabus version**				
		1.0				

Course Objectives:

1. To explore the fundamental concepts of neural network algorithms, architecture and its applications.
2. To explore the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic
3. To provide an exposure to the basics of an evolutionary computing paradigm and its application to optimization problems.

Expected Course Outcomes:

1. Demonstrate the knowledge of the fundamental concepts of Neural networks.
2. Analyse the architecture and algorithms of Neural networks to meet the challenges of soft computing problems
3. Demonstrate the basic concepts of fuzzy approach, fuzzy inference systems for knowledge representation.
4. Develop applications using Fuzzy logic control to solve machine intelligence problems.
5. Demonstrate the basic concepts of genetic algorithms with its applications
6. Develop applications using evolutionary computing paradigms to solve optimization problems.
7. Analyze the architecture of integration of neural networks, fuzzy logic and genetic algorithms.

Student Learning Outcomes (SLO):	**1, 7, 19**

Module:1	**Neural Networks**	**7 hours**

Biological Neural networks, introduction, evolution, basic models of Artificial Neural Network, Pitts model, Perceptron, Adaline(Adaptive Linear Neuron), Back-propagation network, Radial Basis Function network.

Module:2	**Memory Models**	**6 hours**

Pattern association, auto & hetero associative memory models, Bi directional Associative Memory model, Hopfield network

Module:3	**Unsupervised Networks**	**6 hours**

Self-organizing maps, Learning Vector Quantization network, and Adaptive Resonance Theory network.

Module:4	**Fuzzy sets**	**6 hours**

Introduction, fuzzy sets, operations, fuzzy relations, membership functions, fuzzification&defuzzification.

Module:5	**Fuzzy logic and approximate reasoning**	**7 hours**

Fuzzy truth values, fuzzy propositions, fuzzy rules, formation, decomposition and aggregation of rules, fuzzy reasoning, FIS, Fuzzy Decision Making			
Module:6	**Genetic Algorithm**		**5 hours**
Difference between traditional algorithms and GA, basic operators,schema theorem,convergence analysis,stochastic models,applications in search and optimization.Encoding,Fitness Function,reproduction,cross over,mutation.Convergency Theory; Applications-Match word finding,Travelling sales man problem.			
Module:7	**Hybrid Systems**		**6 hours**
Integration of neural networks, fuzzy logic and genetic algorithms.			
Module:8	**Contemporary issues**	**2 hours**	
Expert Talk			
	Total Lecture hours:	**45 hours**	

Text Book(s)	
1.	Sivanandam and S N Deepa, Principles of Soft Computing, 2011, 2nd Edition, Wiley Publications**.**
Reference Books	
1	Samir Roy and Udit Chakraborty: Introduction to Soft Computing Neuro Fuzzy and Genetic Algorithms, 2013, 1st Edition, Dorling Kindersley Licenced by Pearson Education in South Asia.
2.	Ross Timothy J, Fuzzy Logic with Engineering Applications, 2010, 3rd Edition, Wiley Publications

Recommended by Board of Studies	05-03-2016		
Approved by Academic Council	40th	Date	18-03-2016