SUBJECT: COMPUTER SCIENCE						

			L	T	P	C	Time for ESE
DSE	BCS-E804	Soft Computing	5	1	-	6	3 Hrs.

Pre- requisite: A strong mathematical background; proficiency with algorithms and programming skills in C/C++/Java/Python.

Course Objectives:
- To develop the skills to gain a basic understanding of neural network theory, fuzzy logic theory and Genetic Algorithm.
- To introduce students to artificial neural networks, fuzzy theory and Genetic algorithm from an engineering perspective.

Course Outcomes:

CO1	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
CO2	Apply artificial neural networks and fuzzy logic theory for various problems.
CO3	Determine the use of Genetic algorithm to obtain optimized solutions to problems.

Course Contents

UNIT	Contents	Lectures Required
1.	**Introduction:** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.	4
2.	**Neural Networks:** Introduction, what is Neural Network, Learning rules and various activation functions, Supervised Learning Networks, Single layer Perceptron, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications. Unsupervised Learning Networks**.**	16
3.	**Fuzzy Systems:** Fuzzy Set theory, Fuzzy vs. Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.	16
4.	**Genetic Algorithm:** History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.	16
5.	**Introduction to Hybrid Systems.**	8
	Total Lectures	60

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Suggested Text Book(s):	
1.	S.N. Sivanandam, S.N. Deepa, Principles of Soft Computing, Wiley India.
2.	Samir Roy, Udit Chakraborty, Soft Computing, Pearson India.

Suggested Reference Book(s):	
1.	Padam Gulwani Anshuman Sharma, Fundamentals of Soft Computing and Intelligent System, Wiley.
2.	Saroj Kaushik and Sunita Tewari, Soft Computing, Tata McGraw Hill.

Other Useful Resource(s)	
1.	https://nptel.ac.in/courses/106105173
2.	http://vlabs.iitkgp.ernet.in/scte/

Course Outcomes Contributed to Programme Outcomes

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	3	3	3	1	3	2	1	2	2.3
CO2	3	3	1	3	3	2	3	3	2.6
CO3	2	3	2	3	2	2	3	3	2.5
AVG.	2.7	3.0	2.0	2.3	2.7	2.0	2.3	2.7	2.5

Course Outcomes Contributed to Programme Specific Outcomes

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	2	1	3	2.0
CO2	2	3	3	2.7
CO3	1	2	3	2.0
AVG.	1.7	2.0	3.0	2.2

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