Program Elective-II

Soft Computing

Course Code	19CS4601A	**Year**	III	**Semester**	II
Course Category	Program Elective-II	**Branch**	CSE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Mathematics, Probability and Statistics
Continuous Internal Evaluation :	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Understand the basic concepts of soft computing techniques and their applications	**L2**
CO2	Apply fuzzy logic to handle uncertainty and solve problems.	**L3**
CO3	Apply genetic algorithms to solve engineering problems	**L3**
CO4	Apply Nature Optimization algorithms for real-time problems.	**L3**

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3					1	1		1	1			1	
CO3	3					1	1						1	1
CO4	3					1	1							2

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to Soft Computing:** Concept of computing systems, "Soft" computing versus "Hard" computing, Characteristics of Soft computing **Applications of Soft computing techniques:** Handwritten Script Recognition, Image Processing and Data Compression, Automotive Systems and Manufacturing, Soft computing based Architecture, Decision Support System.	**CO1**
II	**Fuzzy Set Theory:** Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations. Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based Systems, Defuzzification Methods	**CO1, CO2**
III	**Fundamentals of Genetic Algorithms:** Genetic Algorithms: History, Basic Concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction.	**CO1, CO3**
IV	**Nature-Inspired Optimization Algorithms:** Differential Evolution, Ant and Bee Algorithms, Particle Swam Optimization.	**CO1,CO4**
V	**Nature-Inspired Optimization Algorithms:** The Firefly Algorithm, Cuckoo Search, The Bat Algorithm, The Flower Algorithm, Parameter Tuning and Parameter Control.	**CO1,CO4**

Learning Resources
Text Books
1. Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications, S. Rajasekaran, G. A. Vijayalakshmi Pai, 2017, PHI Learning. 2. Nature – Inspired Optimization Algorithms, XIN- SHE YANG, Second Edition, 2020, Elsevier.
Reference Books
1. Principles of Soft Computing, S.N.Sivanandam, S.N.Deepa, Wiley India Pvt. Ltd., 2018, Paperback. 2. Genetic Algorithms: Search and Optimization. E. Goldberg. 3. Fuzzy Sets and Fuzzy Logic-Theory and Applications, George J. Klir and Bo Yuan, Prentice Hall, 2015, Paperback. 4. First course on Fuzzy Theory and Applications, Kwang H. Lee, 2005, Springer. 5. Neuro Fuzzy and Soft Computing, S. R. Jang, C.T. Sun and E. Mizutani, 2004, PHI / Pearson Education. 6. Neural Networks Algorithms, Applications, and Programming Techniques, James A. Freeman and David M. Skapura, 2003, Addison Wesley.
e-Resources & Other Digital Material
1. https://nptel.ac.in/courses/106/105/106105173/ 2. https://cse.iitkgp.ac.in/~dsamanta/courses/sca/index.html#resources