

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme		Bachelor of Technology				Branch/Spec.	Computer Engineering/ Information Technology/ Computer Engineering(Artificial Intelligence)		
Semester		VIII				Version	1.0.0.0		
Effective from Academic Year			2025-26			Effective for the Batch admitted in		July 2022	
Course Code		2CEIT8PE2	Course Name			Soft Computing			
Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	-	1	-	3	Theory	40	60	100
Hours	2	-	2	-	4	Practical	30	20	50
Pre-requisites									
Mathematics, Programming									
Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	Comprehend the fuzzy logic and the concept of fuzzy set theory in soft computing.								
CO2	Examine Neuro-Fuzzy and Genetic Algorithm expert system.								
CO3	Implement soft computing techniques like Fuzzy, Multi Objective optimization and Genetic Algorithm.								
CO4	Integrate Soft Computing Techniques with Neural Networks.								
Theory Syllabus									
Unit	Content								Hrs.
1	Introduction to Soft Computing: Soft Computing, Key characteristics and applications of soft computing, Soft vs. Hard computing, Fuzzy logic, Fuzzy set, Crisp vs. Fuzzy Set, Fuzzy Set Properties, Operations on Fuzzy set: Union, Intersection, Complement, Sum and Difference, Equality and Power, Cartesian Product, Fuzzy If-Then Rules – Fuzzy Reasoning, Fuzzy membership functions, Gaussian membership function, Sigmoid membership function, Triangular membership function, Trapezoidal membership function, Fuzzy proposition, Fuzzy interferences, Fuzzy relations- Max-Min Approach, Fuzzification – Defuzzification, Fuzzy Logic Controller, Neuro-Fuzzy modelling.								07
2	Multi-Objective Optimization and Genetic Algorithms: Multi Objective Optimization, Multi-Objective Evolutionary Algorithm, Pareto based Approach, Non- Pareto based approaches, Genetic Algorithm (GA), GA working architecture, Genetic representations, GA Encoding and Selection Techniques, Survival of the Fittest, Fitness Computations, GA Crossover Techniques, GA Mutation, Reproduction, Rank method, Rank space method, GA Case Studies: Optimisation of traveling salesman problem using Genetic Algorithm, Genetic algorithm-based Internet Search Techniques..								08
3	Evolutionary and Swarm Intelligence Algorithms: Evolutionary Algorithm, Ant system, Ant Colony Optimization, Max-Min Ant System, Ant Miner, Snake-Ant Algorithm, Particle Swarm Optimization, Artificial Bee Colony, Cuckoo Search Algorithm, Working architecture, Co-evolution, Plasticity and life-time learning, Lamarckian learning, “No free lunch” theorem, Hybrid fuzzy controller, Fuzzy Logic Controlled Genetic Algorithms.								08
4	Advanced Machine Learning Techniques: Genetic Algorithms–Neural Networks, Neural Networks Fuzzy Logic, Extreme Learning Machine, Training SLFN using ELM, Extreme Learning Machine, Variants of ELM, Applications of ELM, Extended ELM								07
Practical Content									
Practicals, assignments and tutorials are based on the above syllabus.									
Text Books									

1	Soft Computing, Fundamentals, Techniques and Applications by Saroj Kaushik and Sunita Tiwari, McGraw-Hill Education
2	Principles of soft computing by Sivanandam, S. N., and Deepa, S. N., John Wiley & Sons
Reference Books	
1	Genetic Algorithms and Machine Learning for Programmers by Buontemp F., Pragmatic Bookshelf
2	Learning Genetic Algorithms with Python by Gridin I., BPB Publications
ICT/MOOCs Reference	
1	https://archive.nptel.ac.in/courses/106/105/106105173/
2	https://onlinecourses.nptel.ac.in/noc25_ma54/

Mapping of CO with PO and PSO:															
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
CO1	3	2	2	1	1	0	0	0	0	2	0	1	3	2	1
CO2	3	3	3	2	2	0	0	0	0	2	0	2	3	3	2
CO3	3	3	3	2	2	1	0	0	0	2	0	2	3	3	3
CO4	3	3	3	3	2	0	0	0	0	2	0	2	3	3	3