

# TABLE OF CONTENTS

Chapter No.	Title	Page No.
1	<b>INTRODUCTION</b>	01-65
1.1	Optimization Techniques	
1.2	Introduction to Optimization Problems	
1.3	Single and Muti- objective Optimization	
1.4	Classical Techniques	
1.5	Overview of various Optimization methods	
1.6	Evolutionary Computing	
1.7	Genetic Algorithm and Genetic Programming	
1.8	Basic concept	
1.9	Encoding	
1.10	Representation	
1.11	Fitness Function	
1.12	Reproduction	
1.13	Differences between GA and Traditional optimization methods	
1.14	Applications	
1.15	Bio- inspired Computing (BIC)	
1.16	Motivation	
1.17	Overview of BIC	
1.18	Usage of BIC	
1.19	Merits and Demerits of BIC	
2	<b>SWARM INTELLIGENCE</b>	66-106
2.1	Introduction	
2.2	Biological foundations of Swarm Intelligence	
2.3	Swarm Intelligence in Optimization	
2.4	Ant Colonies	
2.5	Ant Foraging Behavior	
2.6	Towards Artificial Ants	
2.7	Ant Colony Optimization (ACO)	
2.8	S-ACO	
2.9	Ant Colony Optimization Metaheuristic	
2.10	Combinatorial Optimization	
2.11	ACO Metaheuristic	
2.12	Problem solving using ACO	
2.13	Other Metaheuristics	
2.14	Simulated annealing	
2.15	Tabu Search	
2.16	Local search methods	
2.17	Scope of ACO algorithms	

<b>3</b>	<b>NATURAL TO ARTIFICIAL SYSTEMS</b>	107-140
	3.1 Biological Nervous Systems	
	3.2 Artificial Neural Networks	
	3.3 Architecture	
	3.4 Learning Paradigms	
	3.5 Unsupervised Learning	
	3.6 Supervised Learning	
	3.7 Reinforcement Learning	
	3.8 Evolution of Neural Networks	
	3.9 Hybrid Neural Systems	
	3.10 Biological Inspirations in Problem Solving	
	3.11 Behaviour of Social Insects	
	3.12 Foraging	
	3.13 Division of Labor	
	3.14 Task Allocation	
	3.15 Cemetery Organization and Brood Sorting	
	3.16 Nest Building	
	3.17 Cooperative transport	
<b>4</b>	<b>SWARM ROBOTICS</b>	141-177
	4.1 Foraging for food	
	4.2 Clustering of objects	
	4.3 Collective Prey Retrieval	
	4.4 Scope of Swarm Robotics	
	4.5 Social Adaptation of Knowledge: Particle Swarm	
	4.6 Particle Swarm Optimization (PSO)	
	4.7 Particle Swarms for Dynamic Optimization Problems	
	4.8 Artificial Bee Colony (ABC)	
	4.9 Optimization biologically inspired algorithms in engineering	
<b>5</b>	<b>CASE STUDIES</b>	178-213
	5.1 Other Swarm Intelligence algorithms	
	5.2 Fish Swarm	
	5.3 Bacteria foraging	
	5.4 Intelligent Water Drop Algorithms	
	5.5 Applications of biologically inspired algorithms in engineering	
	5.6 Case Studies: ACO and PSO for NP-hard problems	
	5.7 Routing problems	
	5.8 Assignment problems	
	5.9 Scheduling problems	
	5.10 Subset problems	
	5.11 Machine Learning Problems	
	5.12 Travelling Salesman problem	