CONTENT

Abs	stract		I	
Cer	tificate		III	
Ack	knowled	gement	IV	
Content				
1.	Introduction			
	1.1	Trends in Optimization	1	
	1.2	Basic Soft Computing Tools	2	
	1.3	Hybrid Soft Computing Systems	4	
	1.4	Scope and Objectives of the Present Work	6	
	1.5	Organization of the Thesis	10	
2.		MIZATION AT A GLANCE	12	
	2.1	Optimization Methods	13	
	2.2	Local and Global Optima	15	
	2.3	Major Issues of Global Optimization	15	
	2.4	Optimization Parameters and Problem Formulation	17	
3.	LITERATURE REVIEW OF SOFT COMPUTING IN OPTIMIZATION			
	3.1	Literature Related to GA	23	
	3.2	Literature Related to FL	30	
	3.3	Literature Related to ANN	32	
	3.4	Literature Related to Hybrid Techniques	34	
4	Comm	The Art Continue Art Overnovers		
4.	GENETIC ALGORITHM – AN OVERVIEW		20	
	4.1	GA Versus Traditional Methods	38	
	4.2	Natural Genetics and GA	39	
	4.3	Elements of GA	40	
	4.4	Genetic Operators	44	
	4.5	The Chromosome Selection Schemes	47	
	4.6	GAs in Constrained Optimization Problems	49	
	4.7	The Working of GA in a Nut Shell	51	

	4.8	Some Advanced Techniques in GA	54	
5.	FUZZY LOGIC - AN OVERVIEW			
	5.1	What is Fuzzy Logic?	60	
	5.2	Fuzzy Set and Fuzzy Set Operations	61	
	5.3	Fuzzy Mathematical Programming	63	
	5.4	α – Cut Method for Optimization	68	
	5.5	Fuzzy Rule Based System	72	
	5.6	Defuzzification Techniques	74	
	5.7	Fuzzy Controller	77	
6.	NEUR	NEURAL NETWORK – AN OVERVIEW		
	6.1	Neural Networks and Their Capabilities	79	
	6.2	Biological Neuron	80	
	6.3	Model of Artificial Neuron	81	
	6.4	Neural Network Terminology	82	
	6.5	Back Propagation Neural Network	85	
7.	Hybr	HYBRIDIZATION OF SOFT COMPUTING TOOLS		
	7.1	The Need for Hybridization	90	
	7.2	Characteristics of Hybrid Soft Computing	91	
	7.3	Combining GA with Fuzzy Logic	92	
	7.4	Combining GA with Neural network	95	
	7.5	Combining Neural Networks with Fuzzy Logic	97	
	7.6	Combining GA, FL and ANN	98	
8.	GA BASED SOFTWARE DEVELOPMENT AND APPLICATIONS			
	8.1	General Remarks	99	
	8.2	The Selected Environment	100	
	8.3	GA Friendly Inbuilt Functions in VB	101	
	8.4	Development of GA Based Software	103	
	8.5	Cost Optimization of RCC Plane Frame	106	
	8.6	Cost Optimization of RCC Water Tank	110	
	8.7	Cost Optimization of Isolated Footing	116	

	8.8	Cost Optimization of Combined Footing	125
	8.9	Cost Optimization of Retaining Wall	130
	8.10	Optimum Design of Silos	136
	8.11	Optimum Design of Folded Plates	143
	8.12	Cost Optimization of Machine Foundation	151
	8.13	Weight Optimization of Gantry Girder	157
	8.14	Weight Optimization of Plane Frames	161
	8.15	Optimization of Plane Trusses in General	167
	8.16	Size Optimization of Plane Truss Example	182
	8.17	Configuration Optimization of Plane Truss Example	184
	8.18	Topology Optimization of Plane truss Examples	189
	8.19	Optimization of Space Trusses in General	197
	8.20	Configuration Optimization of Space Truss Example	200
	8.21	Topology Optimization of Space Truss Example	204
	8.22	Topology Optimization of Continuum Structures	212
	8.23	Closing Remarks	221
9.	FL BASED SOFTWARE DEVELOPMENT AND APPLICATIONS		
	9.1	General Remarks	223
	9.2	Computer Implementation	224
	9.3	Optimum Design of Various Types of Slabs	228
	9.4	Optimum Design of RCC Plane Frames	247
	9.5	Optimum Design of Grid Structures	258
	9.6	Optimum Design of Retaining Wall	266
	9.7	Cost Optimization of Isolated Footing	271
	9.8	Cost Optimization of Combined footing	278
	9.9	Optimum Design of Silos	292
	9.10	Optimum Design of Folded Plates	299
	9.11	Optimum Design of Hyper Shell	303
	9.12	Cost Optimization of Machine Foundation	311
	9.13	Closing Remarks	318

10.	ANN BASED SOFTWARE DEVELOPMENT AND APPLICATION			
	10.1	General Remarks	319	
	10.2	Computer Implementation	319	
	10.3	Circular Column Example	323	
	10.4	Closing Remarks	326	
11.	SOFTWARE DEVELOPMENT AND APPLICATION OF HYBRID TOOLS			
	11.1	General Remarks	327	
	11.2	Computer Implementation of GA-Fuzzy Hybrid Approach	327	
	11.3	Truss Configuration Optimization through GA-Fuzzy Approach	330	
	11.4	GA-Fuzzy Hybridization for Combined Footing	336	
	11.5	GA-Fuzzy Hybridization for Topology Optimization of Plate	338	
	11.6	Computer Implementation of GA-ANN Approach	339	
	11.7	GA-ANN Approach for Problem of Circular Concrete Column	340	
	11.8	Neuro-Fuzzy Approach for Concrete Mix Design	343	
	11.9	Concrete Mix Design Examples	354	
	11.10	GA-Neuro-Fuzzy Approach for Concrete Mix Optimization	355	
	11.11	Closing Remarks	366	
12.	CONCLUSIONS AND CONTRIBUTION			
	12.1	Summary	367	
	12.2	Conclusions	369	
	12.3	Contribution	377	
	12.4	Future Scope	379	
REF	ERENCES		382	
APPENDIX-I		LIST OF PAPERS PUBLISHED	391	