CONTENTS

Title			Page. No
Executive Summary			i
Abbreviations			iii
List of Figures			v
List of Tables			viii
Chapter 1	**INTRODUCTION**		**Page. No**
1.1	Conventional AGC Scenario		1
1.2	AGC in Deregulated Environment		4
1.3	Choice of Controller for AGC		6
	1.3.1	PI Controller	6
	1.3.2	Fuzzy Logic Controller	7
1.4	Combined Intelligence Techniques		8
1.5	Objectives of Research		9
1.6	Outline of the Thesis		10
Chapter 2	**LITERATURE REVIEW**		
2.1	Overview of load frequency control related to conventional AGC		12
2.2	AGC related to Deregulation		13
2.3	AGC related to Fuzzy Control Theory		14
2.4	AGC (Conventional and Deregulated Scenario) related to intelligent Techniques		16
2.5	Widely used Intelligent Techniques		20
Chapter 3	**FREQUENCY CONTROL IN AN ISOLATED POWER SYSTEM WITH INTELLIGENT CONTROLLER**		
3.1	Modeling of an Isolated Power System		21
3.2	Simulink model of single area AGC		22
3.3	PI Controller for Single area AGC		23
3.4	Design and implementation of a Fuzzy Logic Controller in MATLAB		24
3.5	Comparison of PI and FLC Responses		26

3.6 FLC tuning using Genetic Algorithm 27
3.7 Some vital GA realization issues 28
3.7.1 Selection of chromosome length 28
3.7.2 Declaration of Bounds 29
3.7.3 Design of Fitness function 30
3.7.4 Reasonable randomness in population 30
3.7.5 Prevention of self-mating 30
3.7.6 Elitism 31
3.7.7 GA program termination norm 31
3.8 GA Algorithms and parameter setting 32
3.8.1 Algorithm for chromosome generation and selection 32
3.8.2 Algorithm for crossover 32
3.8.3 Algorithm for mutation 33
3.8.4 Parameters for GA 33
3.9 Running the GA 34
3.9.1 Population report 34
3.9.2 Generation 41: Statistics 38
3.9.3 Few landmarks in the time response statistics 39
3.10 Plots of frequency response under different testing conditions 40
3.10.1 System without disturbance 41
3.10.2 System with parametric disturbance 42
3.10.3 System with load disturbance 44
3.11 Conclusion 46
Chapter 4 AGC OF INTERCONNECTED TWO AREA SYSTEM WITH INTELLIGENT CONTROLLER
4.1 Modeling of a two area thermal system (Non- reheat) using integral controller 48
4.2 Design criterion for GA optimized PI controller 49
4.2.1 GA parameters 49
4.2.2 Declaration of bounds 50
4.2.3 Choice of fitness function 50

4.2.4 Simulation result 51
4.2.5 Plots of response of GA PI Controller 52
4.3 Modeling of a two area thermal system (Non- reheat) using Fuzzy Logic controller 54
4.3.1 Design of Fuzzy Logic Controller 55
4.3.2 Membership function of FLC 56
4.4 Optimization of the parameters of FLC using GA 57
4.4.1 Fitness computation 57
4.4.2 Size of chromosome 58
4.4.3 Bounds selection for parameters 58
4.4.4 Parameters for GA 59
4.4.7 Simulation results and discussions 60
4.5 Conclusion 64

Chapter 5 POWER SYSTEMS UNDER DEREGULATION

5.1 Introduction to Restructured AGC 65
5.2 Conventional VS Restructured systems 67
5.3 Concept of Disco participation 67
5.4 Simulink model of a two area AGC after Deregulation 70
5.5 Design of Controller 73
5.6 Design of Fuzzy Logic Controller 73
5.7 Optimal tuning of the gains of FLC using GA 74
5.7.1 Running the GA 76
5.8 System subjected to various testing conditions 78
5.8.1 System with nominal parameters 79
5.8.2 System subjected to parametric disturbances 81
5.8.3 System with dynamically changing Generator Model 84
5.8.4 System with random load disturbance 86
5.9 Conclusion 87

Chapter 6 CONCLUSION AND FUTURE SCOPE

6.1 Findings with regards to an isolated system 88

6.2 Findings with regards to multi-area AGC System 90

6.3 Findings with regards to AGC system under Restructured scenario 91

6.4 Suggestions and Future Scope 93

References 95

Appendix 102

Curriculum Vitae &Publications 109