Contents

		page
	Abstract	
	owledgements	iii
Contents		V
List of Figures		Vii
List of Tables List of Symbols		X Xi
	of Abbreviations	Xii
LISUU		7.11
Chap	oter 1: Introduction	
1.1	Introduction	1
1.2	Author's Contributions	1
	1.2.1 Problem Description	2
	1.2.2 Proposed Work	2
	1.2.3 Proposed Steps	2
1.3	Thesis Organization	3
-	oter 2: Review of Literature	
2.1	Introduction	5
2.2	Solar Power Plant Generation Forecasting: A Review	5
	2.2.1 Factors Affecting Solar Power Generation	6
2.3	Approaches for Solar Power Generation Forecasting	7 8
2.4	Summary	0
	oter 3: Solar Power Plant and Data Description	_
3.1	Introduction	9
3.2	Site Description for Indian Institute of Technology Jodhpur Grid Connected Rooftop Solar Photovoltaic Power Plant	9
	3.2.1 58 kW C-Si based solar PV system description	9
	3.2.2 43 kW C-Si based solar PV system description	9
	3.2.3 Data Description	13
3.3	Site Description for Gujarat Power Corporation Limited Grid Connected SPV Plant	15
,,,	3.3.1 System Description	16
	3.3.2 Online Data Acquisition System	16
	3.3.3 Data Description	18
3.4	Pre-Processing of Data	20
3.5	Summary	21
Chap	oter 4: Proposed Methodology using Artificial Neural Network and Generalized	
	Neural Network Approach	
4.1	Introduction	23
4.2	Artificial Neural Network	24
	4.2.1 Development of Artificial Neural Network	24
	4.2.2 Basic Elements of Artificial Neuron	26
	4.2.3 Architecture of Artificial Neural Network	29
	4.2.4 Learning Paradigms of Artificial Neural Network	30
	4.2.5 Development of forecasting model using artificial neural network	35
4.3	Generalized Neural Network	40
	4.3.1 Conventional Neural Architecture	40
	4.3.2 Development Methodology of Generalized Neural Network 4.3.3 Generalized Neural Network as Universal Approximator	43
	4.3.4 Learning Paradigms of Generalized Neural Network	44 46
	4.3.5 Eminence of Generalized Neural Network	40
4.4	Error Metrics For Accuracy Of Forecasting Model	48

Chapter 5: Performance Indices of PV Power Plant

5.1 5.2	Introduction Performance Indices of Solar Photovoltaic Power Plant 5.2.1 Plant Energy Output 5.2.2 Array Yield 5.2.3 Final Yield 5.2.4 Reference Yield 5.2.5 Performance Ratio 5.2.6 Capacity Utilization Factor	49 49 49 50 50 50 50
5.3 5.4 5.5	Performance Analysis of C-Si And A-Si PV Based Rooftop Grid-Tied Solar Photovoltaic Plant Performance Analysis of 5 Mw GPCL Solar Power Plant Summary	50 58 64
Cha	pter 6: Solar Power Generation Forecasting using Artificial Neural Network and	
c .	Generalized Neural Network Approach	6-
6.1	Introduction	65
6.2	Forecasting Of Solar Power Plant Generation 6.2.1 Forecasting Model Assessment for Rooftop Based Solar Power Plant Generation	65 65
	6.2.1.1 Forecasting Model Assessment for Rooftop Based Solar Power Flant Generation 6.2.1.1 Forecasting Of 15 Minute Averaged PV Power Generation For a 58kW C-Si based Rooftop PV System	65
	6.2.1.2 Analysis of Solar Power Variability Due to Seasonal Variation and its Forecasting For 43 kW A-Si Based Rooftop PV System	67
	6.2.1.3 Ground-based measurement for solar power variability forecasting modelling using Generalized Neural Network	71
	6.2.2 Ground Based 5 MW Solar Power Plant Generation Forecasting 6.2.2.1 Forecasting of 5MW Solar Photovoltaic power Plant using Generalized Neural Network	75 77
6.3	Summary	80
Chap	oter 7 : Conclusion and Future Work	81
Anne	exure A: A study of correlation between input parameters GHI and GTI (Global Tilted Irradiation) and their impact on neural network-based forecasts	
A.1	Introduction	83
A.2	Proposed Model	83
A.3	Result	84
Anne	exure B: A comparative study of ARIMA and ANN model based solar power generation forecasting	
B.1	Introduction	89
В.2	Results	89
B.3	Conclusion	91
Refe	rences	92