

Contents

Synopsis	v
Acknowledgement	xvii
1 Introduction	1
1.1 General	1
1.1.1 Relevant Highlights of Electricity Act 2003	2
1.1.2 Relevant Highlights of Tariff Policy 2006	3
1.2 State-of-Art	4
1.3 Motivation	9
1.4 Thesis Organization	11
2 Demand Side Management And Price Elasticity Concept	13
2.1 Introduction	13
2.2 Demand Response Concept	14
2.3 Benefits of Demand Response	15
2.4 Methods of Demand Response	16
2.5 Price Elasticity of Demand	16
2.5.1 Price Elasticity Matrix	17
2.5.2 Necessity of Estimating Price Elasticity	20
2.6 Mathematical Model	23

<i>CONTENTS</i>	xx
2.7 Data Availability	25
2.7.1 Possibility of Upward Bias in Price Elasticity Estimates	26
2.8 Result	27
2.9 Conclusion	30
3 Open Access Scenario	31
3.1 Introduction	31
3.2 Open Access Charges	32
3.2.1 Point of Connection, State T&D loss	33
3.2.2 Network Usage and System Operation	33
3.2.3 Cross Subsidy Surcharge	34
3.2.4 Renewable Purchase Obligation	35
3.3 Effective Cost-of-Supply to the Consumer	37
3.4 Cost Benefit Analysis of STOA Consumers	37
3.5 Step Ahead	42
3.6 Conclusion	43
4 Clustering of Feeders	44
4.1 Introduction	44
4.2 Load Profile Study	45
4.3 Clustering Techniques	47
4.3.1 Self Organizing Maps	49
4.3.2 K-Means Algorithm	50
4.4 Measure of Similarity	51
4.5 Result	52
4.6 Conclusion	59
5 Time-of-Use Tariff	60
5.1 Introduction	60

5.2	Time-of-Use in Madhya Guajrat Vij Company	62
5.3	Factors Limiting the Rise in Night Consumption	62
5.4	Problem Formulation	63
5.4.1	Objective Function	65
5.4.2	Constraints	65
5.5	Evolutionary Programming Technique	67
5.5.1	Overview	69
5.6	Result and Discussion	72
5.7	Conclusion	75
6	Cross Subsidy Reduction from Tariff	76
6.1	Introduction	76
6.2	Basic Model and Recommended Modifications	79
6.2.1	Cost-of-Service	80
6.2.2	Cost-of-Service Coverage	84
6.2.3	Compound Annual Growth Rate	84
6.2.4	Aggregate Revenue Requirement	84
6.2.5	Universal Charge	84
6.2.6	Profit	85
6.3	Modified Model with Tariff Constraints	85
6.4	Method 1	86
6.4.1	The Objective Function	86
6.4.2	Operating Constraints	87
6.4.3	Bounds	88
6.5	Sequential Quadratic Programming	88
6.5.1	Algorithm Steps	90
6.6	Method 2: Iterative Technique	91
6.7	Availability of Data and Assumptions	94

6.7.1	Initial Computations	95
6.8	Prediction of Consumption and Tariff	96
6.9	Result and Discussion	97
6.9.1	Method 1: Sequential Quadratic Programming Tech- nique	97
6.9.2	Method 2: Iterative Technique	99
6.10	Conclusion	105
7	Conclusion	106
7.1	General	106
7.2	Major Findings	107
7.3	Scope for Future Research	108
8	List of Publications	129