

# Contents

	<b>Page</b>
<i>Foreword</i>	iii
<b>Loss Reduction in Power Transmission and Distribution— Introduction</b>	<b>1</b>
<b>PART I</b>	
<b>Loss Reduction in Secondary and Primary Distribution</b>	<b>5</b>
<b><i>Secondary Distribution</i></b>	<b>7</b>
<b>Chapter I</b>	
1. Secondary Distribution	9
2. Field Studies in LT Distribution	9
3. Causes for High Losses	10
4. Measures to Minimise Losses in LT Distribution	10
5. Appropriate Conductor Size	10
6. Improper Voltage Level and Their Effects on Losses	13
<b>Chapter II</b>	
1. Method of Maintaining Appropriate Voltage Levels in Distribution— A Case Study	17
2. The Effect of Ratio of Primary Line Length to Secondary Line Length	19
3. High Voltage Distribution System (HVDS) Vs 3-Phase Low Voltage Distribution System (LVDS)	21
4. Conclusions	23
<b>Chapter III</b>	
1. Optimum Location of Distribution Transformers— Procedure for Applying the method A Case Study	26
<b>Chapter IV</b>	
1. Capacitor Application on LT Distribution— Across Individual Consumers, At Vantage Points, At distribution transformers, Simplified static var compensator for rural distribution	34
2. Loss Reduction in Lighting Systems—Domestic and Commercial Installations	40

	Page
<b>Chapter V</b>	
1. Energy Conservation in Irrigation Pumps, Field Studies	42
2. Energy Conservation in Domestic and Commercial Sectors	45
3. Energy Conservation in Industries	47
4. Reduction in Transformer Losses	50
5. Energy Conservation in Thermal Stations	51
<b>Chapter VI</b>	
1. Load Management — Demand Side Management	53
Induced DSM, Imposed DSM, Impact of DSM on a typical power system	53
<b><i>Primary Distribution</i></b>	<b>63</b>
<b>Chapter VII</b>	
1. Study of Primary Feeders—Suitable type of conductor	
Size of conductor, based on economies/based on MW.Km capacity	65
2. Methods of Improving Voltage Regulation of Primary Feeders—	
Capacitor application for voltage improvement,	
Application of Voltage regulators/boosters application of series capacitors,	
Application of switched capacitors and AVRs	70
<b>Chapter VIII</b>	
1. Selection of Appropriate Capacity of Distribution Transformer	
and its Optimal Utilisation	78
<b>Chapter IX</b>	
1. Capacitor Application for Maximum Line Loss Reduction	81
2. For Single Capacitor Bank	81
3. More Than One Bank of Capacitors	84
4. Capacitor Application to Achieve Maximum Possible Loss Reduction	
and Better Voltage Improvement	85
5. Application of a Two Level Capacitive Compensation	86
6. Capacitor Application for Feeders having Wide Fluctuating Reactive Loading	87
Fixed and/or Switched Shunt Compensation and Optimisation	91
<b>Chapter X</b>	
1. Optimal Distribution System Planning	93
2. Reactive Power Management in Distribution Systems	95
<b>PART II</b>	
<b>Transmission</b>	
	<b>97</b>
<b>Chapter I</b>	
1. Sub-transmission	99
2. Number of Transformations	101

	<b>Page</b>
<b>Chapter II</b>	
1. Transmission—	103
Causes for poor voltages, Remedial Measures	106
<b>Chapter III</b>	
1. Reactive Power	107
<b>Chapter IV</b>	
1. Methods of Reactive Compensation—	109
Series compensation in HV and EHV Transmission, Application Economic consideration, Optimal shunt compensation on HV and EHV power systems	
2. Static-VAR-Compensation	114
3. Reactive Power Control	117
<b>Chapter V</b>	
1. Flexible AC Transmission Systems (FACTS)	120
<b>Chapter VI</b>	
1. Commercial Losses—Causes and Remedies	122
2. Detailed Study of Erroneous Meters—	122
An approach to tackle non-technical losses by computer billing, Theft of energy, Tamper/proof—arrangements	
<i>Conclusions</i>	128
<i>References</i>	130
<i>Appendices</i>	133