CONTENTS

		Page
Foreword		(iii)
Preface		(v)
CHAPTER I	***Overview of Renovation and Modernisation of* Thermal Power Plants in India**	1
1.	Introduction	1
2.	Major Problems in Thermal Power Plants	3
3.	Genesis of Renovation and Modernisation Programme of Thermal Power Stations in India	7
4.	Strategy of Renovation and Modernisation (R&M) Programmes	8
5.	Conclusion	11
CHAPTER II	**Methodology and Engineering of Renovation and Modernisation**	27
1.	Introduction	27
2.	*Remaining Life Assessment (RLA) Studies*	27
3.	Execution and Implementation of RM and LE Programmes	29
4.	Engineering Aspects of RM&LE	35
5.	*Conclusion*	52
CHAPTER III	**Boilers and Auxiliaries**	59
1.	Introduction	59
2.	Study of Existing Boilers	59
3.	Collection of Data for Design Audit and Assessment	60
4.	Condition Assessment / RLA Study	62
5.	Design Check	69
6.	Anticipated R&M Activities for Pressure Parts	70
7.	Anticipated R&M Activities for Non-pressure Parts	74
8.	New Technologies for Industrial Boilers	99
9.	High Temperature and Low Temperature Corrosion and Fuel Oil Ash	105
10.	Boiler Water Chemistry and its Management	111
11.	Quality Control during Renovation and Modernisation	117
12.	*Typical Case Studies*	118
13.	Conclusion	126
CHAPTER IV	**Steam Turbines and Auxiliaries**	129
1.	Introduction	129
2.	Construction Features	131
3.	Material Selection for Steam Turbines	144
4.	Operation Regimes	145
5.	Critical Components	150
6.	Failure / Damage Mechanisms of In-Service Materials	150
7.	Condition Assessment	152
8.	R & M Life Extension Based on IA / RLA	173
9.	Surface Condensers	175
10.	Steam Turbine Coolers	183
11.	L.P. Heaters (210/250/500 MW)	185
12.	*Typical Case History of R & M and LE Studies on Turbines*	192
CHAPTER V	**Turbo-Generators and Auxiliaries**	201
1.	Introduction	201
2.	Condition Monitoring and Diagnostics Techniques for Turbo-Generators	202

3.	Residual Life Assessment and Life Extension Programme	206
4.	Special Checks during R&M Execution	217
5.	Spares	218
6.	R&M Packages for Generator and Auxiliaries	218
7.	Turbo-Generator Coolers	225
8.	Typical Case History of R&M and Repair Activities of Turbo-Generators	232
9.	Conclusion	236
CHAPTER VI	**Power Transformers**	239
1.	Introduction	239
2.	Condition Assessment	241
3.	Residual Life Assessment	249
4.	Refurbishment	258
5.	Uprating Considerations	267
6.	On-line Monitoring System	269
7.	Conclusion	282
CHAPTER VII	**Plant Electrical Systems**	321
1.	Introduction	321
2.	Major Electrical Equipments and Accessories	322
3.	Conclusion	333
CHAPTER VIII	**Control and Instrumentation Systems**	337
1.	Introduction	337
2.	R&M Considerations	337
3.	Need for R&M of Control & Instrumentation System	339
4.	Advantages of Advanced C&I Systems	340
5.	Selection of Thermal Generating Units for R&M of C&I	340
6.	Technology for R&M of C&I	341
7.	Scope of R&M of C&I	342
8.	Installation	348
9.	Implementation	349
10.	Case Study of R&M of C&I Package for 150 MW Unit, Trombay Thermal Station, The Tata Power Company Limited	352
11.	Conclusion	375
CHAPTER IX	**Coal Handling Plants**	379
1.	Introduction	379
2.	Type of R&M Activities carried out at various Power Stations	379
3.	Details of R&M Activities carried out at various Power Stations in the Country	380
4.	Typical Cases of R&M Works carried out in Thermal Power Stations	380
CHAPTER X	**Ash Handling Plants**	399
1.	Introduction	399
2.	Types of R&M Activities carried out at various Power Stations	399
3.	Utilisation of Ash	400
4.	Typical Case Studies	400
5.	Conclusion	404
Bibliography		413
Acknowledgements		414
About the Authors		415