# TABLE OF CONTENT

**APPROVAL FORM ..... iii**
**INTELLECTUAL PROPERTY STATEMENT FORM..... iv**
**ABSTRACT ..... vi**
**PREFACE ..... vii**
**LIST OF ABBREVIATIONS AND SYMBOLS ..... ix**
**GLOSSARY ..... xi**
**TABLE OF CONTENT..... xii**
**LIST OF FIGURE ..... xvi**
**LIST OF TABLE ..... xviii**
**LIST OF EQUATION.....xxii**
**LIST OF APPENDIX ..... xxvi**
**Chapter I Introduction .....1**
I.1 Background..... 1
I.2 Problem Formulation..... 7
I.3 Research Objective..... 7
I.4 Problem Boundaries ..... 7
I.5 Research Advantage ..... 8
I.6 Writing Systematic ..... 8
**Chapter II Theoretical Basis.....10**
II.1 Maintenance Management.....10
II.1.1 Preventive Maintenance ..... 10
II.1.2 Corrective Maintenance..... 11
II.2 Reliability .....11
II.2.1 Definition of Reliability ..... 11
II.2.2 Life Data Analysis..... 11
II.2.3 Lifetime Distribution (Life Data Models) ..... 12
II.2.4 Basic Statistical Background..... 13
II.2.5 The Exponential Distribution ..... 20
II.2.6 The Weibull Distribution..... 25

II.2.7 The Normal Distribution ..... 29
II.2.8 Failure Pattern ..... 31
II.3 Maintainability ..... 32
II.4 Availability ..... 33
II.4.1 Inherent Availability ..... 33
II.4.2 Operational Availability ..... 33
II.4.3 Achieved Availability ..... 33
II.5 System Breakdown Structure ..... 34
II.6 Risk Matrix ..... 35
II.7 Maintenance Program Develompent ..... 36
II.8 Reliability Centered Maintenance (RCM) ..... 37
II.8.1 Failure Mode Effect Analysis (FMEA) ..... 39
II.8.2 Function and Failure ..... 40
II.8.3 Failure Consequences ..... 42
II.8.4 Preventive Task ..... 44
II.8.5 Default Action ..... 46
II.8.6 Interval Preventive Task ..... 47
II.8.7 The RCM Decision Diagram ..... 52
II.9 Reliasoft ..... 57
II.9.1 Input Data ..... 58
II.9.2 Data Process ..... 58
II.9.3 Output Data ..... 68
II.10 Spareparts Management ..... 68
II.10.1 Non Reapairable Spares ..... 68
II.10.2 Repairable Spares ..... 69
**Chapter III Research Methodology ..... 72**
III.1 Conceptual Model ..... 72
III.2 Problem Solving Systematics ..... 75
III.2.1 Initiation Step ..... 77
III.2.2 Data Collection Step ..... 77
III.2.3 Data Processing Step ..... 78
III.2.4 Analysis and Conclusion Step ..... 81

**Chapter IV Collecting and Processing Data ..... 83**
IV.1 Data Collection ..... 83
IV.1.1 Description of Main Condenser ..... 83
IV.1.2 Description of Hotwell Pump ..... 84
IV.1.3 Steam Turbine Maintenance Activity ..... 84
IV.1.4 Operating Data dan Maintenance Cost ..... 85
IV.2 Build Equipment Hierarchy ..... 87
IV.3 Deciding Critical Equipments ..... 90
IV.4 Reliability Centered Maintenance Processing ..... 94
IV.4.1 Function and Standard Performance ..... 94
IV.4.2 Functional Failure ..... 94
IV.4.3 Failure Mode ..... 94
IV.4.4 Failure Mode ..... 94
IV.4.5 Failure Consequences ..... 94
IV.4.6 Preventive Task ..... 95
IV.4.7 Default Action ..... 95
IV.5 Statistical Test ..... 95
IV.5.1 Failure Data ..... 96
IV.6 Maintenance Interval Calculation ..... 101
IV.6.1 Maintenance Interval of Sheduled On Condition ..... 101
IV.6.2 Maintenance Interval of Failure Finding ..... 101
IV.7 Reliasoft RCM ++ ..... 103
IV.8 Maintenance Cost Calculation ..... 105
IV.8.1 Schedule On Condition Cost ..... 105
IV.8.2 Failure Finding Cost ..... 107
IV.9 Spare Parts Optimization ..... 108
VI.9.1 Calculation Requirement of Non-Repairable Spare Parts ..... 109
VI.9.2 Calculation Requirement of Repairable Spare Parts ..... 152
**Chapter V Data Analysis ..... 159**
V.1 Build Equipment Hierarchy Analysis ..... 159
V.2 Deciding Critical Equipment Analysis ..... 160
V.3 RCM Information Worksheet Analysis ..... 163

V.4 Comparison Between Existing Maintenance and RCM Results . 164
V.5 Deciding Preventive Maintenance Optimal Time Interval Analysis . ..... 168
V.5.1 Determination of Time Interval On Condition Analysis ..... 168
V.5.2 Determination of Time Interval On Failure Finding Analysis .... 169
V.6 Analisis RCM++ ..... 171
V.7 Proposed and Existing Maintenanc Cost Analysis ..... 172
V.8 Analysis Determination of The Optimal Number of Spare Parts 172
**Chapter VI Conclusion and Suggestion ..... 176**
VI.1 Conclusion ..... 176
VI.2 Suggestion ..... 176
IV.2.1 Suggestion for PGE KMJ 4 ..... 181
IV.2.2 Suggestion for The Next Research ..... 181
**BIBLOGRAPHY .....182**