

## CONTENTS

ENDORSEMENT PAGE .....	iii
PAGE OF DEDICATION .....	iii
STATEMENT .....	v
PREFACE .....	vi
NOMENCLATURE AND ABBREVIATION .....	vii
ABSTRACT .....	viii
INTISARI .....	ix
CONTENTS .....	x
LIST OF FIGURES .....	xii
LIST OF TABLES .....	xiii
CHAPTER I INTRODUCTION .....	1
1.1 Background .....	1
1.2 Problem Statement .....	7
1.3 Research Objective .....	8
1.4 Research Novelty .....	8
1.5 Research Benefits .....	13
CHAPTER II Literature Review and Theoretical Background .....	14
2.1 Literature Review .....	14
2.2 Theoretical Background .....	17
2.2.1 Battery State of Health .....	17
2.2.2 Battery Equivalent Circuit Model .....	19
2.2.3 Neural Network .....	21
2.2.3.1 Perceptron .....	26
2.2.3.2 Activation Function .....	29
2.2.4 Regression .....	32
2.2.4.1 Linear Regression .....	32
2.2.4.2 Polynomial Regression .....	33
2.3 Hypothesis .....	35
CHAPTER III Methodology .....	36
3.1 Experiment and Dataset Preparation .....	36
3.2 Electrical Equivalent Circuit Model .....	38
3.3 Parameter Initiation .....	39
3.4 Neural Network Model .....	40
3.5 Parameters Analysis .....	44
3.6 Capacity Loss and State of Health Estimation .....	45
3.7 Model Evaluation .....	46
3.7.1 Error Analysis .....	46
3.7.2 Model Testing in Various Condition .....	47
3.7.3 Computational Cost Analysis .....	47
CHAPTER IV RESULTS AND DISCUSSION .....	49
4.1 Battery Testing Result .....	49

4.2	Parameter Initiation .....	50
4.3	Neural Network Training Performance .....	52
4.4	Parameters Analysis .....	54
4.5	Capacity Loss and State of Health Estimation.....	57
4.6	Model Evaluation .....	60
4.6.1	Error Analysis .....	61
4.6.2	Computational Cost Analysis .....	65
4.6.3	Comparison With Previous Methods .....	66
CHAPTER V CONCLUSION .....		68
REFERENCES .....		70