



UNIVERSITI TEKNOLOGI MARA

**AN EVOLUTIONARY PROGRAMMING APPROACH
TO SOLVE PRICE-BASED UNIT COMMITMENT
(PBUC) PROBLEM IN ELECTRICITY MARKET.**

BARBARA MINOT ANAK THOMAS

Thesis submitted in fulfilment of the requirements
for the degree of
Bachelor of Engineering (Hons) Electrical Engineering

Faculty of Electrical Engineering

July 2017

ACKNOWLEDGEMENT

Praise to God that has granted me a good health and allows me to complete my thesis successfully. With God blessings, I am able to finish my project on time and this thesis is finally accomplished. The completion of this project may be almost impossible without the help and support from my supervisor, course mates and family.

I would like to wish my appreciation for those who have been helping and giving me an inspiration in the completion of this project. Special thanks to my dedicated supervisor, Assoc. Prof. Bibi Norasiqin binti Sheikh Rahimullah for her guidance, assistance, support and lots of helps throughout this project. From her supervision, many aspects regarding on this project has been explored. Her sharing of knowledge, ideas and support also contribute to completion of this thesis project within time given.

I also want to thank my friends who were always supportive by giving ideas and contribution to the completion of my project. Their genuine support and sharing of knowledge made this journey becomes more meaningful to me. Very grateful thanks to my beloved parents, Mr. Thomas Aton and Mdm. Melanie Rengian as well as my beloved family members who are continuously supporting me with their endless motivation throughout my studies.

Last but not least, thanks to everyone who has participated directly or indirectly in contribute towards the completion this thesis, including my lectures who helped me a lot to ensure that I am successfully completed the project in time.

ABSTRACT

This study presents an evolutionary programming method to solve profit based unit commitment (PBUC) problem by considering the power and reserve energy. PBUC problem is a mixed integer and continuous nonlinear optimization problem. PBUC is difficult to solve due to the tremendous dimension, the objective function is non-linear, and it involves a lot of constraints. In this study, PBUC is used to maximize profit while satisfying the forecasted demand and constraints. Evolutionary Programming (EP) is used in this study to solve PBUC problem while considering market rule. The proposed method is tested on a three generation units system and the results show that this method is able to provide the solution to PBUC problem.

TABLE OF CONTENTS

APPROVAL.....	i
DECLARATION.....	ii
ACKNOWLEDGEMENT.....	iii
ABSTRACT.....	iv
LIST OF FIGURES.....	vii
LIST OF TABLES.....	viii
LIST OF SYMBOLS AND ABBREVIATIONS.....	ix
CHAPTER	
1	INTRODUCTION.....1
	1.1 Background of Study.....1
	1.2 Problem Statement.....2
	1.3 Significant of Study.....2
	1.4 Objectives.....2
	1.5 Scope of Work.....3
	1.6 Thesis Organization.....3
CHAPTER	
2	LITERATURE REVIEW.....5
	2.1 Introduction.....5
	2.2 Profit-Based Unit Commitment (PBUC)
	Under Deregulated Market.....7
	2.3 Artificial Intelligence Methods in
	Solving PBUC Problem in Electricity
	Market.....8
	2.3.1 Artificial Bee Colony (ABC) Optimization.....9
	2.3.2 Particle Swarm Optimization (PSO).....10
	2.3.3 Binary Fish Swarm Algorithm (BFSA).....11
	2.3.4 Shuffled Frog Leaping Algorithm (SFLA).....12
	2.3.5 Genetic Algorithm (GA).....13
	2.4 Sequential Evolutionary Programming (SEP)
	to Solve PBUC Problem.....14

CHAPTER	
3	METHODOLOGY.....17
	3.1 Introduction.....17
	3.2 Problem Formulation.....18
	3.3 Introduction to Evolutionary Computation.....21
	3.3.1 Evolutionary Programming (EP).....21
	3.3.2 Flowchart of EP.....22
	3.3.3 The Steps to Solve PBUC Problem by Using EP.....23
CHAPTER	
4	RESULTS AND DISCUSSIONS.....25
	4.1 Introduction.....25
	4.2 EP Parameter Setting.....26
	4.3 Unit Schedule of Generator Units.....29
	4.4 Final Solution Results for Previous Method (SEP).....30
	4.5 Final Solution Results for EP Method.....32
CHAPTER	
5	CONCLUSION AND RECOMMENDATION.....35
	5.1 Conclusion.....35
	5.2 Recommendation.....36
REFERENCES.....	37