

**SOLVING UNIT COMMITMENT PROBLEM BY USING PARTICLE
SWARM OPTIMIZATION TECHNIQUE**

This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons.) Electrical

**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA**



MUHAMMAD AQIL BIN AB RAHMAN

2009190825

Faculty of Electrical Engineering

UNIVERSITI TEKNOLOGI MARA

40450 SHAH ALAM, SELANGOR DARUL EHSAN

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful and The Most Beneficent. Praised be to Prophet Muhammad S.A.W, his companions and those who are on the path as what he preached upon. It is with deepest sense of gratitude to Allah S.W.T who has given the strength and ability to complete this project and thesis.

It is a pleasure to remind the fine people in the Universiti Teknologi MARA (UiTM) for their sincere guidance I received to complete my final year project. I would like to express my sincere gratitude to project supervisor, Miss Norlee Husnafa Ahmad for the continuous support, patience, motivation, enthusiasm and immense knowledge. Allowing me to question her and giving prompt replies for my uncertainties in all fields.

I also would like to add a few words to express my thanks to my parents for their unstoppable motivation and inspiration and at the same time providing me all time help which has made me to come on this platform.

Last but not least, my best regards and thanks to those whom I forgotten to mention who helped me directly or indirectly in the completion of this thesis report successfully and also for the preparation of this report. Thank you so much.

ABSTRACT

This paper proposed one of the Evolutionary Computation (EC) components which is Particle Swarm Optimization (PSO) in solving a problem of unit commitment (UC). In fact, one of the common problems in electrical power system is unit commitment (UC) which is complicated decision making for a various constraints and may affect the economical scheduling of units. Basically, the unit commitment problems involve scheduling on/off states of generating units, which minimizes the operating cost, start-up cost and shut-down cost as mentioned for various operating constraints. So, the objective of this study is to analyze and search for the UC schedule which generates minimum operational cost by using 10 generators. This system had been tested in satisfying the total output with load demand which is divided into number of small intervals of 24 hours. By using programming method, the problem of UC has been solved efficiently by a lot of discussion on PSO technique based on IEE Transaction on Power System data. Therefore, the optimal time and losses can be minimized which may affect the total cost operating by determining which and how many units should be operate in one time to meet a required load demand while satisfying specified operating criteria in order to reach an economic operation.

TABLE OF CONTENTS

TITLE	PAGE
APPROVAL	ii
DECLARATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1	
1.0 INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 PROBLEM STATEMENT	3
1.3 OBJECTIVE	4
1.4 SCOPE OF WORKS	4
1.5 ORGANIZATION OF THESIS	5

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Electrical power industry has been implemented several efficient techniques or methods for many past years in order to solve Unit Commitment (UC) problem. However, as rapidly undergoes restructuring of power industry, the role of UC models is changing. Due to this problem, the requirement of economic benefits and improved solution is necessary [1, 2]. Therefore, the attention now is more on developing better optimization technique as the number of generator unit increasing, the unit commitment problem might increase. The number of generator units is likely to increase even more with the actual development of the system [1]. On the other hand, as referred to [3-4] the small improvements of solutions may results significant changes in electricity market. So, there are a lot of strategies or techniques that are being used as mitigation to solve this UC problem in power system.

In power system, Unit Commitment (UC) is used to schedule the generators such that the total production cost over the scheduled time horizon is minimized under the spinning reserve and operational constraints of generator units [2]. Based on [5-6], UC problem can be categorized into two sub-problems or decision processes which are unit scheduling and economic dispatch. Unit scheduling is used to determine on/off state of generating units in each hour which might be subjected to system capacity requirements, including