# APPLICATION OF MULTISTAGE ARTIFICIAL IMMUNE SYSTEM FOR SOLVING UNIT COMMITMENT

**Thesis presented in partial fulfillment for the award of the**
**Bachelor in Electrical Engineering (Hons)**
**UNIVERSITI TEKNOLOGI MARA**

**NAZLAN AZIZI BIN ABD AZIZ**
**FACULTY OF ELECTRICAL ENGINEERING**
**UNIVERSITI TEKNOLOGI MARA**
**40450 Shah Alam, Malaysia**
**MEI 2009**

# ACKNOWLEDGEMENT

In the name of Allah, The Al-Mighty and Most Illustrious

It is the deepest of gratitude of His Highness who gives the strength and ability in order to complete this project. All good aspirations, devotions and prayers are due to Allah whose blessing and guidance have helped me throughout the entire project.

First of all, I would like to express my special thanks to my project supervisor, Prof. Dr. Titik Khawa Abdul Rahman which gives the full guide to complete this project. I am very grateful for her dedication in guidance, advice and her good ideas and suggestion for completing the project.

Finally, thanks for all colleagues especially my loving parents, lecturers, my friends and those had involved and helped me directly or indirectly in successful completion of my project.

***Nazlan Azizi Bin Abd Aziz***
*Faculty of Electrical Engineering*
*Universiti Teknologi Mara*
*Shah Alam*
*Mei 2009.*

# ABSTRACT

This paper presents a new approach to develop a multistage of artificial immune system (AIS) method for solving the unit commitment using suitable method programming. The objective is to find the generating scheduling such that the total operating cost can be minimized, when subjected to the range of a set of constraints. This means that it is needed to find the optimal generating unit commitment in the power system for each of twenty four hours. The AIS is an optimization technique for solving unit commitment problem, operates on a system, which is designed to encode each unit's operating schedule based on its minimum up/down time. An initial population of first solution is generated at random. Each schedule is formed here by committing all of the units according to their initial status. Here, the first solution are obtained from a predefined set of solutions (i.e., each and every solution is adjusted to meet the requirements). Then a random recommitment is carried out with respect to the unit's minimum downtimes. The initial population will be clone in the first of AIS step which is known as a clonal selection process. Then selected generating units are subject to an affinity mutation process, which improves their affinity to the selective population. Numerical results are shown the comparison between the total costs of both single and multistage obtained by using the AIS method.

**Keyword** - Artificial Immune System, unit commitment.

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# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction

In power stations, the investment is quite expensive and the resources in operating them are considerably becoming sparse of which the focus turns to optimizing the operating cost of the power station. In today's world, the economic operation in power station considers in minimization of operating cost and it becomes an outmost necessity to meet the demand as well as optimize the generation. Unit commitment (UC) in power systems refers to the optimization problem for determining the on/off states of generating units that minimize the operating cost for a given time horizon. The solution of the unit commitment (UC) is a complex optimization problem.

The exact solution of the UC can be obtained by a complete evaluation of all feasible combinations of generating units which could be a very huge number. The unit commitment has commonly been formulated as a non-linear, large-scale, mixed-integer combinational optimization problem. The committed units is need to meet the forecasted system load at minimum operating cost, subject to a large set of other system, technological and environmental constraints. Due to important start-up and shut-down costs, the problem is in general very hard to solve, as it is not possible to perform a separate optimization for each time interval. Furthermore, given that the operating costs are depend on the load assigned to each generator. The problem of committing units over the planning horizon is directly connected to the problem of assigning the load demand to the on-line units. Economic operation in power system concerns with the minimization of operating cost. Unit commitment is an