SOLVING UNIT COMMITMENT PROBLEM WITH WIND POWER ENERGY USING MULTI AGENT EVOLUTIONARY PROGRAMMING OPTIMIZATION TECHNIQUE

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

UNIVERSITI TEKNOLOGI MARA

MALAYSIA

MOHD IKHWAN BIN MAHASAN
2010681646

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGY MARA
MALAYSIA

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful.

In the name of ALLAH S.W.T., The most Beneficent, The most Merciful. It is with the deepest sense of the Al-Mighty Allah that gives me the strength and ability to complete this research. All good aspirations, devotions and prayers are due to ALLAH whose blessing and guidance have helped me throughout the entire research.

I would like to give my deepest gratitude to my beloved parents, my brothers and sisters for their endless love, prayer, and encouragement during the process of this study.

Special appreciation goes to my supervisor, Mr. Muhammad Nazree Bin Che Othman, for his supervision and constant support during the process of completing this research. His co-operation and guidance is much indeed appreciated. His contribution as a project supervisor so much helps me in completing this final year project.

Sincere thanks to all my friends for their kindness and moral support during the assignment progress until it is fully completed.

Besides, special thank goes to FYP coordinator, Mrs. Wan Noraishah bt. Wan Abdul Munim for her guidance and also thanks to authority of Universiti Teknologi MARA (UiTM) especially from Faculty of Electrical Engineering for providing me with a good environment and facilities to complete this report.

Last but not least, thank you to those who indirectly contributed in this assignment. Thank you very much.

ABSTRACT

This thesis presents an approach to search for an optimal solution for Unit Commitment Problem with wind power generation. The objectives of this research are to find the optimal cost of generation and to review the effect of the presence of renewable energy which is the wind energy in the conventional Unit Commitment problem. Unit commitment involves the scheduling of start-up and shutdown of generating units, an indirect determines the optimum power should be generated by each unit committed over a period of time to meet the required load demand at minimum possible cost. In this study, Multi Agent Evolutionary Programming has been used to solve the optimal unit commitment for 24 hour periods. Multi Agent Evolutionary Programming is a combination of two Artificial Intelligent techniques which are Multi Agent System and Evolutionary Programming. In this research, the Multi Agent Evolutionary Programming technique has been applied with 10 thermal based generator data along with wind power generation. The 10 thermal generator data are obtained from previous research paper while the data for wind power is collected from power forecasting report by National Renewable Energy Laboratory (NREL). This research has considered a few constraints that go along with Unit Commitment problem such as load demand constraint, generator limit, and 10% reserve margin. The comparison of the result obtained is to observe the performance of Multi Agent Evolutionary Programming technique against conventional Evolutionary Programming technique.

TABLE OF CONTENTS

Contents