



**COMPARISON OF ECONOMIC LOAD DISPATCH PROBLEM  
BY USING PARTICLE SWARM OPTIMIZATION (PSO) AND  
EVOLUTIONARY PROGRAMMING (EP)**

This project is presented in partial fulfillment for the award of the

Bachelor of Engineering (Hons.) Electrical

**UNIVERSITI TEKNOLOGI MARA**

**KU AZILA BINTI KU TEH**

**FACULTY OF ELECTRICAL ENGINEERING**

**UNIVERSITI TEKNOLOGI MARA**

**40450 SHAH ALAM, SELANGOR, MALAYSIA**

**JULY 2013**

**FACULTY OF ELECTRICAL ENGINEERING**

**UNIVERSITI TEKNOLOGI MARA**

## **ACKNOWLEDGEMENT**

Syukur Alhamdulillah, with the greatest gratitude to Allah The Almighty for His gracious blessing and guidance throughout the whole period taken by me to successfully complete this project by send many people into my life which willing to help me whenever I had problem. Without His permission, it is impossible to make anything happen and become true.

I would like to take this opportunity to sincerely express my highest appreciation to my project supervisor, Puan Aida Sulinda binti Kusim for her valuable guidance, teachings, suggestions, advices and support throughout this project. Thank you also to my co-supervisor, Encik Muhammad Nazree bin Che Othman for bearing with my incompetence and patiently guide me to the end of this project.

Furthermore, my deepest gratitude to my family and to all those who have helped making this journey worthwhile with all the support and encourage. I would also want to thank my entire friends that contribute in this project.

Finally, I would like to thank all those who have contributed information, knowledge, ideas, time and effort directly and indirectly in the progression of this final year project. Honestly, I am very grateful for all their favors and support, and I will remember it throughout my life. Thank you so much again and may Allah S.W.T bless them.

Thank You.

## **ABSTRACT**

Economic Load Dispatch (ELD) is a problem in power system that arise in scheduling the generation unit in order to minimizing the cost and at the same time satisfying the constraints. Most of generating units nowadays use fossil fuel as energy source. However, fossil fuels are depleting from day to day and the demand for electricity is increasing. This situation causes the price of fossil fuel is also increasing. Due to the importance of Economic Load Dispatch (ELD) in power system, many techniques have been introduced to solve ELD problem. The objective of this study is about comparing two methods which were Particle Swarm Optimization (PSO) and Evolutionary Programming (EP) to solve ELD problem. This techniques were been compared in term of computational efficiency, robustness and simplicity. Using IEEE 26 bus system and IEEE 30 bus system, ELD problem was presented and PSO and EP were applied to solve the problem. The result showed that PSO gives better performance compared to EP.

# TABLE OF CONTENTS

<b>CONTENTS</b>	<b>PAGE</b>
Title	i
Approval	ii
Declaration	iii
Dedication	iv
Acknowledgement	v
Abstract	vi
Table of Contents	vii
List of Figures	ix
List of Tables	x
List of Symbols and Abbreviations	xi
<b>Chapter 1 INTRODUCTION</b>	
1.1 Background of study	1
1.2 Problem Statement	2
1.3 Objectives	2
1.4 Scope of Work	2
1.5 Thesis Organization	3
<b>Chapter 2 LITERATURE REVIEW</b>	
2.1 Introduction	5
2.2 Economic Load Dispatch Basic Theory	6
2.3 Economic Load Dispatch Constraints	9
2.3.1 Generation Limits Constraints	9
2.3.2 System Losses	10
2.3.3 Power Balance	10
2.4 Techniques to Solve Economic Load Dispatch	11

<b>Chapter 3</b>	<b>METHODOLOGY</b>	
3.1	Introduction	13
3.2	Particle Swarm Optimization (PSO)	13
3.2.1	PSO's Acceleration Factor	15
3.2.2	PSO's Flow Chart	16
3.3	Evolutionary Programming (EP)	19
3.3.1	EP's Mutation Process	19
3.3.2	EP's Flow Chart	20
<b>Chapter 4</b>	<b>RESULTS AND DISCUSSIONS</b>	
4.1	Introduction	22
4.2	First Case Study	23
4.3	Second Case Study	27
4.4	Third Case Study	31
<b>Chapter 5</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	
5.1	Conclusions	33
5.2	Recommendations	34
References		35
Appendixes		38