

**ECONOMIC LOAD DISPATCH FOR PLANTS HAVING
DISCONTINUOUS FUEL COST FUNCTIONS**

**This is represented in partial fulfillment for the award of the Bachelor of
Electrical Engineering (Hons)
UNIVERSITI TEKNOLOGI MARA**



**AZIDA BINTI AZIZ
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR, MALAYSIA**

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the most beneficial, most merciful and the almighty one, it is with deepest serve gratitude of the Al-Mighty that gives strength and ability to complete this project.

I would like to take this opportunity to express my greatest thankful to my project supervisor, Associate Professor Bibi Norasiqin bin Sheikh Rahimullah for her guidance, advices, supervision, encouragement, faith to me in helping me in accomplishing and understand the concept of this project.

Finally, I would love to say thanks to my beloved family for their support and unending prayers and also to my beloved friends, Anis Nurhidayati, Siti Farizah, Nasrul Ridhwan and others for their understanding directly or indirectly in successful completion of my project.

May Allah repay all your kindness...

ABSTRACT

Economic Dispatch(ED) Solution gives the optimal combination of power output of all generating units in order to minimize total fuel cost while satisfying the load demand and operational constraints. In recent years, the study of economic load dispatch problems also include the solution for combined cycle cogeneration plant(CCCP). From this study, an efficient algorithm is used to solve the economic dispatch for CCCP. The proposed method is tested on a system of two thermal units and one CCCP unit and the results show that the generation cost of the system can be minimized.

Index term – Economic dispatch (ED), Quadratic programming (QP), Optimal power flow (OPF), Combine cycle cogeneration plant (CCCP), Combined heat and power (CHP), Simple cycle cogeneration plant (SCPP), Micro genetic algorithm (MGA), Genetic algorithm (GA), Power (P) and Voltage (V).

TABLE OF CONTENTS

CONTENTS	PAGE
DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABBREVIATIONS	x
CHAPTER 1	
INTRODUCTION	
1.0 Introduction	1
1.1 Research Objective	6
1.2 Scope of work	6
1.3 Summary of thesis	6
CHAPTER 2	
LITERATURE REVIEW	
2.0 Introduction	8
2.1 Definition of Economic Dispatch	9
2.2 Function of Economic Dispatch	10
2.2.1 Planning for tomorrow's dispatch	10
2.2.2 Dispatching for power system today	11
2.3 Importance of Economic Dispatch	11
2.4 Constraints Affecting Economic Dispatch	11
2.4.1 Base Load Power Plants	12
2.4.2 Peak Load Power Plants	12
2.4.3 Load Curve	12
2.5 Economic Dispatch including Losses	13

TABLE OF CONTENTS

CONTENTS	PAGE
2.5.1 B-coefficients Matrix	14
2.6 Operating Cost of a Thermal Plant	15
2.6.1 Lagrange multiplier method	17
2.7 Area Factors Limiting the Effectiveness of Dispatch ing Minimizing Customer Costs	18
2.7.1 Geographic region	18
2.7.2 Generation reserves	18
2.7.3 Transmission conveniences	18
2.8 Factor affecting Costs	18
2.9 Fuel Costs Characteristic	19
2.9.1 Thermal Plants	19
2.9.2 Combined Cycle co-generation Plants	19
2.9.2.1 Steam Turbine	21
2.9.2.2 Gas Turbine	21
2.9.3 Factors Influencing Cogeneration Choice	21
2.9.3.1 Base thermal load matching	22
2.9.3.2 Thermal load matching	22
2.10 Quadratic Programming	22
CHAPTER 3	
METHODOLOGY	
3.0 Introduction	24
3.1 Problem Statement	24
3.2 Quadratic Programming with Optimization Toolbox	26
3.3 Optimization Toolbox in Matlab	26
3.3.1 fmincon in Optimization Toolbox	27
3.3.2 Lagrange Multiplier	29
3.3.3 Hessian Matrix	31