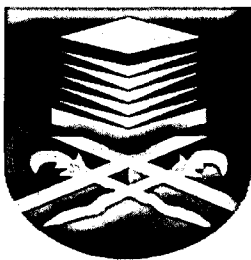


**SOLVING UNIT COMMITMENT USING SHUFFLED FROG
LEAPING ALGORITHM (SFLA)**

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



FASHIRUL AZMEER BIN MOHD FADZIL
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA
JULY 2015

ACKNOWLEDGEMENT

In the name of Allah, the Most Beneficent and the Most Merciful. All praises to Allah, Lord of the Universe, with also bless and regard upon Prophet Muhammad S.A.W. His companion and the people who follow His path.

First of all, I would like to express my sincere appreciation and gratitude to my final project supervisor, Assoc. Professor Bibi Norasiqin Bt. Sheikh Rahimullah, for her invaluable ideas, support, critics guidance and encouragement since the very beginning of this project. She has far exceeded the expectation with a great supervision and provided means for the establishment of the ground of a good friendship.

Not to forget, I am extremely grateful to my beloved family members. Without their unlimited dedication, support and love throughout so many years, I would never have got this far. My sincere appreciation also extends to all my friends and others who have provide me with their assistance directly or indirectly in completing this thesis. Their views and suggestions are really useful indeed.

ABSTRACT

This thesis presents a solution to Unit Commitment (UC) problem of generating units based on Shuffled Frog Leaping Algorithm (SFLA). The proposed SFLA in this study is developed using Matlab programming. This method is applied to the IEEE 30 bus with 6 units system for one day scheduling period. The simulation results obtained using the proposed algorithm show that the minimum cost can be obtained for the schedule.

Keywords - shuffled frog leaping algorithm (SFLA), unit commitment (UC)

TABLE OF CONTENTS

APPROVAL	i
AUTHOR DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
ABBREVIATIONS	ix
CHAPTER 1	1
INTRODUCTION	1
1.1. BACKGROUND OF STUDY	1
1.2. PROBLEM STATEMENT	5
1.3. SIGNIFICANT OF STUDY	5
1.4. PROJECT OBJECTIVES	6
1.5. SCOPE OF WORK	6
1.6. THESIS ORGANIZATION	7
CHAPTER 2	9
LITERATURE REVIEW	9
2.1. UNIT COMMITMENT	9
2.2. OBJECTIVES OF UNIT COMMITMENT	10
2.3. QUANTITY TO SUPPLY	10
2.4. BACKGROUND ON THE UNIT COMMITMENT ANALYSIS	11
2.4.1. Heuristic Method	11
2.4.2. Genetic Algorithm	12
2.4.3. Particle swarm optimization	14
2.4.4. Lagrangian relaxation	15
2.4.5. Dynamic programming	16
2.5. ELEMENTS IN UNIT COMMITMENTS	17
2.5.1. GENERATING UNIT CONSTRAINTS	17
2.5.1.1. Generating limit	17
2.5.1.2. Minimum-Up Time	18

2.5.1.3. Minimum-Down Time.....	18
2.5.1.4. Must-Run Unit.....	19
2.5.2. OPERATING COST FUNCTION.....	19
2.5.2.1. Start-up Cost.....	19
2.5.2.2. Fuel Cost.....	21
2.5.3. SYSTEM LOAD DEMAND	23
CHAPTER 3.....	24
METHODOLOGY	24
3.1. INTRODUCTION	24
3.2. MATLAB PROGRAMMING	25
3.3. SHUFFLED FROG LEAPING ALGORITHM.....	26
3.4. PSEUDO CODE OF SFLA	26
3.4.1. Initial Population.....	26
3.4.2. Sorting and Distribution.....	27
3.4.3. Memplex Evolution.....	27
3.4.4. Shuffling.....	28
3.4.5 Terminal Condition.....	28
3.5. STEPS OF SHUFFLED FROG LEAPING ALGORITHM	29
3.6. PATTERN OF MEMETIC EVOLUTION OF SFLA	30
3.7. MATHEMATICAL MODELLING	33
3.7.1. Unit Commitment Problem Formulation	33
3.7.2. Economic Dispatch (ED)	33
3.7.3. System Power Balance.....	34
3.7.4. Minimum and Maximum Limit of Power	34
3.8. OPTIMIZATION USING SFLA	35
CHAPTER 4.....	38
RESULT AND DISCUSSIONS	38
4.1. INTRODUCTION	38
4.2. SYSTEM PARAMETERS	38
4.3. RESULTS	40
4.3.1. CONVERGENCE OF THE COST OF OPERATION	42
CHAPTER 5.....	46
CONCLUSION	46
CHAPTER 6.....	47
REFERENCES.....	48