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E-learning concept of interactive method in optimal  
dispatch generation / Abdul Mukmin Abdul Rashid.

**E-LEARNING CONCEPT OF ITERATIVE METHOD  
IN OPTIMAL DISPATCH GENERATION**

**Abdul Mukmin bin Abdul Rashid**

**BEKP**

**July 2009**

**“I hereby declare that I have read through this report entitle “E-Learning Concept of Iterative Method in Optimal Dispatch Generation in Power Plant” and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)”**

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**E-LEARNING CONCEPT OF ITERATIVE METHOD IN OPTIMAL DISPATCH  
GENERATION IN POWER PLANT**

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**A report submitted in partial fulfillment of the requirement for the degree  
of Bachelor of Electrical Engineering (Industrial Power)**

**Faculty of Electrical Engineering**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**JUNE 2009**

I declare that this report entitle “E-Learning of Iterative Method in Optimal Dispatch Generation in Power Plant” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....*Mukmin*.....

Name : ABDUL MUKMIN B. ABDUL RASHID

Date : 2 July 2009

**To my beloved father and mother**

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## ABSTRACT

Electronic learning (E-Learning) is a type of education where the medium of instruction is computer technology and it can accommodate multiple learning styles through the use of media, text and live technology mediated interactions. In order to study about “*E-Learning Concept of Optimal Dispatch Generation*”, it contributes many benefits for student and lecturer. E-learning allowing students to choose content and tools appropriate to their interest, needs, and skill levels. Lecturers also can include several of learning styles and materials that can attract students to give full attention and consistency. E-learning’s concept also can describe the learning object efficiently through simulation and animation that can increase student’s understanding and encouragement. An iterative method that used to solve the problem in generator dispatch also can be included in this concept. In conclusion, this project are profitable and helpful in teaching and learning process.

## ABSTRAK

Pembelajaran elektronik (E-Learning) adalah sejenis proses pembelajaran dan pengajaran di mana mediumnya adalah teknologi komputer dan ia boleh memuatkan pelbagai jenis corak pembelajaran melalui penggunaan media, teks dan teknologi maya berteraskan interaksi. Oleh itu, proses pembelajaran "*E-Learning Concept of Optimal Dispatch Generation*", menyumbang banyak faedah untuk pelajar dan pensyarah. E-pembelajaran membolehkan pelajar memilih kandungan dan kaedah yang bersesuaian dengan minat, keperluan serta tahap kemahiran mereka. Pensyarah-pensyarah juga boleh mengaplikasikan pelbagai gaya pengajaran dan bahan-bahan yang boleh menarik perhatian pelajar-pelajar untuk memberi perhatian penuh dan menggalakkan minat untuk belajar. Konsep E-pembelajaran juga dapat mengaplikasikan isi kandungan pelajaran dengan menyeluruh disertai simulasi dan animasi yang berkaitan yang meningkatkan kefahaman dan penggalakkan. Kaedah "*Iterative Method*" juga dapat dipaparkan dengan berkesan dengan konsep ini. Kesimpulannya, projek ini membantu dan membawa manfaat dalam proses pengajaran dan pembelajaran.



## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>DECLARATION</b>	<b>ii</b>
	<b>DEDICATION</b>	<b>iii</b>
	<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
	<b>ABSTRACT</b>	<b>v</b>
	<b>ABSTRAK</b>	<b>vi</b>
	<b>TABLE OF CONTENTS</b>	<b>vii</b>
	<b>LIST OF TABLES</b>	<b>x</b>
	<b>LIST OF FIGURES</b>	<b>xi</b>
	<b>LIST OF APPENDICES</b>	<b>xiii</b>
<b>1</b>	<b>INTRODUCTION</b>	
	1.1 Project Background	1
	1.2 Problem Statement	2
	1.3 Objective	2
	1.4 Scope	3
	1.5 Project Significance	3
	1.6 Outline Report	4
<b>2</b>	<b>LITERATURE REVIEW</b>	
	2.1 Three Phase System	5
	2.1.1 Screen Shot for Three Phase System	6
	2.2 Interactive Learning on Alternating Current Power Transformer	7
	2.2.1 Screen Shot for Interactive Learning on Alternating Current Power Transformer	8
	2.3 Protein Couseware	9
	2.3.1 Screen Shot for Protein Couseware	10

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
	2.4 History of E-Learning	11
	2.4.1 E-Learning in Malaysia	12
	2.5 Level of E-Learning	12
	2.6 Iterative Method in Optimal Generation	
	Dispatch	13
	2.7 Scope of Optimal Dispatch	14
	2.8 Operating Cost of Power Plant	15
	2.9 The Lambda Iteration Method	16
	2.10 Equation of Optimal Dispatch Generation	18
	2.11 Step for Calculation	18
<b>3</b>	<b>METHODOLOGY</b>	
	3.1 Project Design and Procedure	21
	3.2 Macromedia Flash 8	23
	3.2.1 Main Component	24
	3.2.2 Flash Development	29
	3.3 Visual Basic 6.0	30
	3.3.1 Visual Basic Development	31
<b>4</b>	<b>RESULT AND DISCUSSION</b>	
	4.1 Macromedia Flash	33
	4.1.1 What is Power Plant?	35
	4.1.2 Power Plant Operation	37
	4.1.3 Iterative Method	39
	4.1.4 Quiz	42
	4.2 Flash Animation Basics	42

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
	4.3 Cost Estimator for Power Plant	43
	4.3.1 Splash Screen	43
	4.3.2 Cost Estimator Development	44
	4.4 Computer Programming	45
	4.5 Combination of Macromedia Flash with Visual Basic	35
<b>5</b>	<b>CONCLUSION AND RECOMMENDATIONS</b>	
	5.1 Conclusion	48
	5.2 Suggestions	50
	<b>REFERENCES</b>	<b>51</b>
	<b>APPENDICES</b>	<b>52</b>

**LIST OF TABLES**

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
2.1.	Types of e-learning	12
3.1	Example of learning object	25
3.2	Learning design process	26
3.3	Example of learning design	26
3.4	Example of storyboard	28
4.1	Description of button	34

## LIST OF FIGURES

<b>FIGURE</b>	<b>TITLE</b>	<b>PAGE</b>
2.1 (a)	Main menu interface	6
2.1 (b)	Phasor diagram	6
2.1 (c)	Three phase circuit	7
2.2 (a)	Main menu interface	8
2.2 (b)	Simulation of voltage regulator	8
2.2 (c)	Tutorial for basic principle of transformer	9
2.3 (a)	Welcome screen	10
2.3 (b)	Introduction menu	10
2.3 (c)	Protein class contents	11
2.3 (d)	Quiz	11
2.4	YTL power plant	14
2.5	Heat rate and fuel cost curve	14
2.6	Fuel price hike from 2004-2008	15
2.7	Flowchart of calculation steps	20
3.1	Flowchart of project methodology	22
3.2	Macromedia Flash workspace	23
3.3	Flowchart of developing Flash	29
3.4	Visual Basic workspace	30
3.5	Create form to initialize project	31
3.6	Button and Textbox	31
3.7	Code writing for the program	32
3.8	Run the program	32
4.1	Welcome scene	33
4.2	Main menu	34
4.3	Submenu of what is power plant	35
4.4	Definition of power plant	36
4.5	Type of power plant	36

4.6	Video of power plant	37
4.7	Submenu of power plant operation	37
4.8	How it work content	38
4.9	How it work animation	38
4.10	Distribution of electricity	39
4.11	Submenu of iterative method	39
4.12	Introduction of iterative method	40
4.13	Heat rate curve	40
4.14	Steps of iterative method	41
4.15	Example of iterative method	41
4.16	Quiz	42
4.17	Timeline in Flash panel	43
4.18	Splash screen interface	44
4.19	Cost estimator	44
4.20	Cost estimator operation	45
4.21	Flowchart of combination	47

**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>	
A	Example of Calculation and Solution	52
B	Programming Code for Cost Estimator	54
C	Programming Code for Splash Screen	64
D	First Main Menu Flash Screen	66
E	Second Main Menu Flash Screen	67
F	Iterative Method Flash Screen	68
G	YTL Corporation Berhad	70

## CHAPTER 1

### INTRODUCTION

#### 1.1 Project Background

Electronic learning (E-learning) is a type of education where the medium of instruction is computer technology and it can accommodate multiple learning styles through the use of media, text and live technology mediated interactions. In order to study about Optimal Dispatch Generation, it contributes many benefits for student and lecturer. It allowing students to choose appropriate contents and tools that fitting with their interest, needs, and skill levels. Lecturers also can include several of learning styles and materials that can attract students to give full attention and consistency. E-learning's concept also can describe the learning object efficiently through simulation and animation that can increase student's understanding and encouragement. An iterative method that used to solve the problem in generator dispatch also can be included in this concept.

E-learning has many benefits especially for students in learning and exploring what they learn in their live. Some of the advantages of e- learning are:

- i. Self-directed, allowing students to choose content and tools appropriate to their different interests, needs, and skill levels.
- ii. Accommodates multiple learning styles using a variety of delivery methods geared to different learners.
- iii. Provide self-paced instruction for learners wanting to move ahead or learners that wanting extra practice.
- iv. Increase consistency when the learning is captured and delivered by technology.
- v. Engages users with stimulating content and interactivity that teaches and reinforces.



Lecturers also get benefits from this concept when they can include several of learning style that can attract students to give full attention and consistency. E-Learning is the use of technology to enable people to learn anytime and anywhere [6]. Furthermore, it can include training, the delivery of just-in-time information and guidance from experts.

## **1.2 Problem statement**

The manual learning process did not stimulate and encourage most of students in understanding the Optimal Dispatch Generation problem. Most of them have difficulties in solving the problem using numerical method through long and complicated calculation. Moreover, manual learning process can be helpful by lack of source or content that displayed in learning material. Besides, some of students usually lose of track when they make a single mistake during long calculation. To expertise the method by manual learning process are troublesome for some of students and need plenty of times to completely understood.

The slide show presentation that widely use in teaching process are often not designed for self-studying. Slide show presentation that usually provided by Microsoft Power Point is designed for teaching process especially for lecturer who placed a keyword for his quick reference to explained futher detail about the lecture. Futhermore, those keywords make easier for lecturer that helped them to draw complicated diagram that relatively involved in their lecture [7].

## **1.3 Objective**

The objectives of this project are:

- i. To applicate an interactive way in study about Optimal Dispatch of Generation using Visual Basic and Macromedia Flash software.
- ii. To design an E-learning tool that contains notes, examples and Graphical User Interface(GUI).
- iii. To expand and efficiently ease learning and teaching process by include several styles of learning.

#### **1.4 Scope**

In this project, it consists of the lesson about Economic Dispatch of Generator in power plant. It will focus briefly on calculation method that is numerical method. This type of learning includes notes, quiz or example and graphical user interface as the element to explore and study. In order to accomplish this project, both software that are Macromedia Flash and Visual Basic are really essential. In order to study about Optimal Dispatch Generation, e-learning contributes many benefits for student that allowing them to choose content and tools appropriate to their interest, needs, and skill levels.

#### **1.5 Project Significance**

This project was developed such an e-learning system for Iterative Method in Optimal Generation Dispatch. Technology tools are enabling interactive education (IE) to become strength in developing a worldwide culture of learning. IE will foster lifelong learning and will be assisted by feedback between the student and the computer or other collaborators. Education will be considered individual differences and depending on what learners achieved or acquired rather than the length of time to completed this program. This should be implemented in the engineering field, as engineer itself refers to the application of science and technologies into real life of world.

Particularly, Optimal Dispatch of Generator is among the important element of Power Industries which the students of Electrical Engineering field should well understand or in other words should be in their finger tips. They also must gained the ideas that the main reason of Optimal Dispatch Generator is to find the real and the reactive power scheduling of each power plant in such a way as to minimize the operating cost.

## **1.6 Outline Report**

This report is separated into five chapters. Chapter 1 is the introduction of project that will possess project's background, scope, objective and problem statement. This chapter mainly described about the objective and goal of this project. At this part, preliminary of the content of the overall project will be observed.

Chapter 2 consist research about the project by collecting the data and information before proceed to next stage of development of this report. It also describes about the optimal dispatch generation and the iterative method. This is preceded by Chapter 3, which highlights on the method and tools of the project. Both aspects are vital ingredients in development stage of this project.

In Chapter 4, it covered about the result and discussion for each progress in this project. Lastly, Chapter 5 will conclude overall progress of this project and also includes suggestions for further study and development.

## CHAPTER 2

### LITERATURE REVIEW

Literature review was an activity for researcher to study about project or paperwork that have been done by some one else. Those research must be done in their scope of project, which means the research must be related to the projects that have been suggested. In order to make project achieved, advantage and disadvantage must be noted as a guideline. From the topic that have been suggested “E-Learning concept of Iterative Method in Optimal Generation Dispatch”, computer is the main equipment that played vital role in e-learning. In other to do that the related project that are computer-based learning must be required and taken as literature review. Paperwork or journal that related with power plant should be taken as it can be guideline or instruction for the future requirement and development.

#### 2.1 Three Phase System

It is a sample project of e-learning that has been published by Professor Dr. Marizan, Zainuddin Mat Isa, and Azrita Alias. This project is about three phase system which existed in our power system network. As a result from the observation, the software is full with content that related with the topic above, refer to Figure 2.1(a). Animation that have been use for explaining the theory also attracted and easily to understand. As an example in Figure 2.1(b), for phase sequence, the author explained it with angle and motion between phases. Formula that related to theory also been displayed for quick review as the users guidance as for unbalance load section, formula to calculate neutral current also have been explained clearly which need to recognize each phase after neutral current has been determined.

### 2.1.1 Screen Shot for Three Phase System

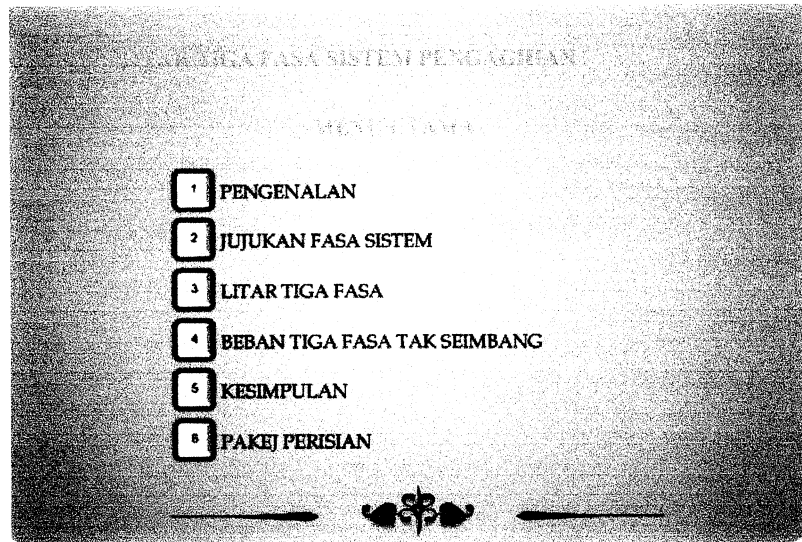


Figure 2.1(a): Main menu interface

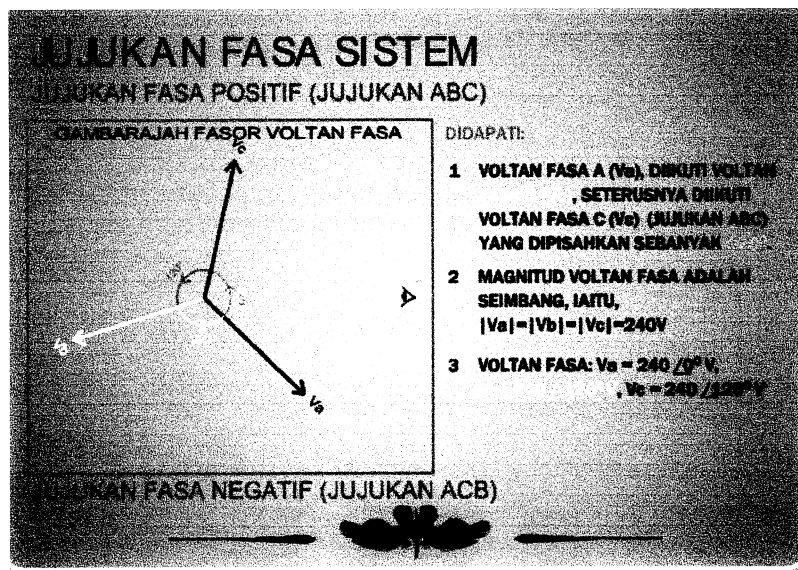


Figure 2.1(b) : Phasor diagram

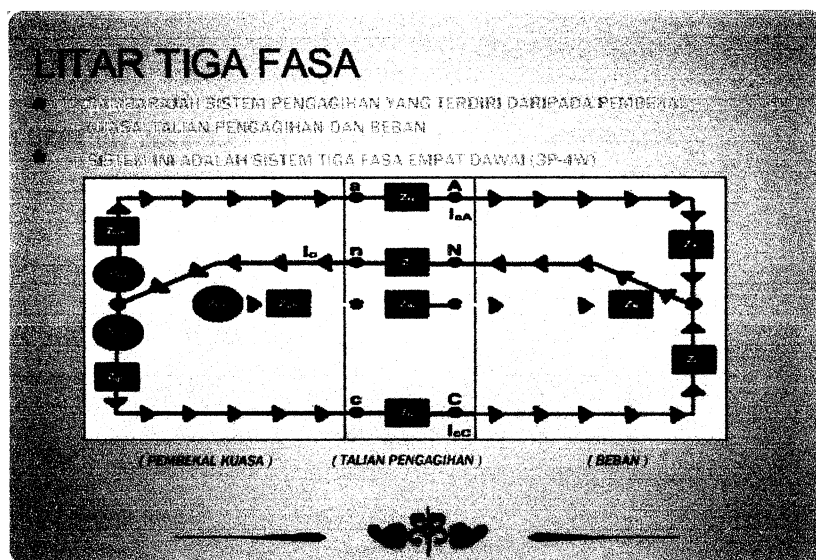


Figure 2.1(c) : Three phase circuit

## 2.2 Interactive Learning on Alternating Current Power Transformer

This project was developed by Gabriel Anak Jatu for “Interactive Learning on Alternating Current Power Transformer”. This project is a software based, which contains a learning course for general Alternating Current Power Transformer. Thus, the software developed will produce an interactive learning course system for AC Power Transformer. The interactive concept is approved by the simple animation as shown in Figure 2.2(b). Furthermore, this project was demonstrated the meaning of “interactive” by combining all of the interactive option such as tutorial and simulation like Figure 2.2(c). However, this project had some weakness such as lack of attractive interface and graphic.

**BASIC PRINCIPLES OF TRANSFORMER**

A  kVA,  V,  V, 50 Hz single-phase transformer has  turns on the secondary. Calculate:

(a) The approximate values of the primary current;  
 (b) The approximate number of primary turns.

Solutions: **CALCULATE**

(a)  $\frac{S}{V_1} = I_1$  (Primary Current)  $\rightarrow \frac{34 \text{ kVA}}{57 \text{ V}} = 596.4912280 \text{ A}$

(b) Number of primary turns,  $N_1 = \frac{N_2 V_1}{V_2} = \frac{35 \times 57}{87} = 22.93103$

Figure 2.2(c): Tutorial for basic principle of transformer

### 2.3 Protein Courseware

Protein courseware is the project that inspired by creativeness that also really essential in other to attract users by it's wonderful animation and user interface as shown in Figure 2.3(a). This course was implemented by Zurina Yahya that used easy and simple menu interfacing for commanding other option of menu in Figure 2.3(b). This program also included interactive option such as quiz and tutorial. The only weakness that can be observed is too many notes that can be similar to Power Point presentation.

### 2.3.1 Screen Shot for Protein Courseware

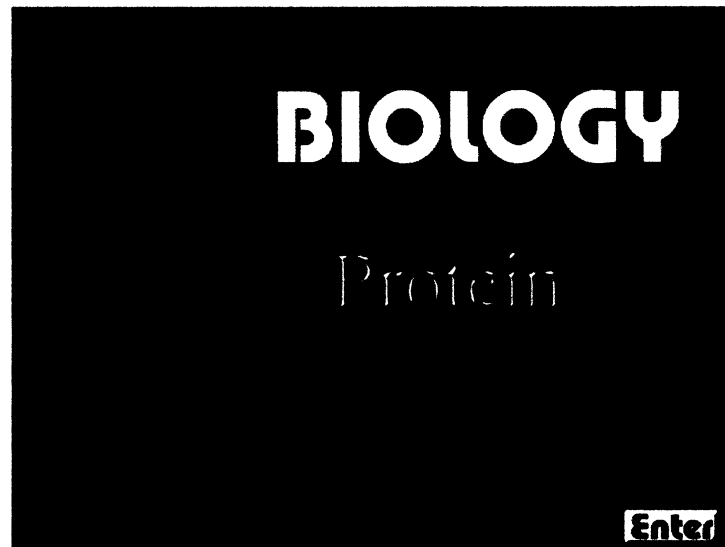


Figure 2.3(a): Welcome screen

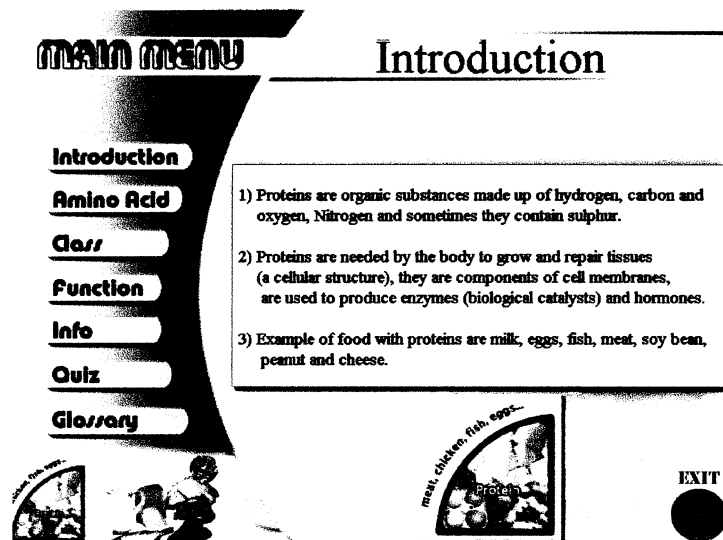


Figure 2.3(b): Introduction menu