

Contents

الآيات الكريمة	I
Dedication	II
Acknowledgements	III
Abstract	IV
سخلاص الـ	V
Contents	VI
List of Abbreviations.....	VIII
List of Symbols	IX
List of figures	XI
List of tables	XII

Chapter One General Review

Introduction	1 1.1
Problem Statement	1 1.2
1.3 Objectives of Thesis.....	2
Methodology.....	2 1.4
1.5 Outlines of Thesis	3

Chapter Two Transformer Theory

2.1 Transformer Theory	4
2.1.1 Introduction	4
2.1.2 The Ideal Transformer.....	4

2.1.3 Losses of Transformer	7
2.1.4 Determination of Transformer Parameters	9

Chapter Three

VISUAL BASIC (V.B) Programming

3.1 Introduction	15
3.2 A brief Description of (V.B)	15
3.3 The (V.B) Enviroment	16
3.4 Steps of (V.B) Programming	18

Chapter Four

Proposed and Varification Program

4.1 The Proposed Program	20
4.2 Running “ETS-lab” Program	22
4.3 Program Varification	34
4.3.1 Suggested Procedures.....	34
4.3.2 Open Circuit Test	35
4.3.3 Short Circuit Test.....	35
4.3.4 Manually Report.....	36
4.3.5 Simulation program Repotr	40
4.3.6 Discussion	41

Chapter Five

Conclusions and Recommendations

5.1 Conclusions	42
5.2 Recommendations	42
References	43
Appendix (A)	

Appendix (B)

Appendix (C)

List of Abbreviations

-e.m.f .Electromagnetic force
- ETS-Lab .Electrical Transformer Simulator Lab
-F.S .Full Scale
-MDI .Multiple Document Interface
-m.m.f magnetomotive force
-V.B .VISUAL BASIC
-V.R Voltage Regulation.

List of Sympols

Φ_m	...The maximum value of total flux linking that turns	Webers
Φ_p	.....Flux linkage through the primary winding	Webers
Φ_s	.....Flux linkage through the second winding	Webers
F	.....The supply frequency	(hertz (Hz)
B_m	.....Maximum value of flux density in the core	Tesla
A	.....Nett cross-sectional area of the core	mm ²
I_{oc}	.....Exciting current as read by ammeter	A
V_{oc}	.....Applied voltage as read by voltmeter	V
P_{oc}	.....Power as measured with wattmeter	W
V_{sc}	.....Applied voltage as read by voltmeter	V
I_{sc}	....Input short-circuits current as read by ammeter	A
P_{sc}	.....Input power as read by wattmeter	W
R_c	.....Core resistance	Ohm
X_m	.....Magnetism reactance	Ohm
R_p	.....Primary winding resistance	Ohm
X_p	.....Primary winding leakage reactance	Ohm
R_s	.....2nd winding resistance	Ohm
X_s	..... 2nd winding leakage reactance	Ohm
V_p	.....Primary supply voltage	V
V_s	.....2nd terminal (load) voltage	V
E_p	.....Primary winding voltage	V
E_s	.....2nd winding voltage	V
I_c	.....Core current	A
I_m	.....Magnetism current	A
I_1	.....Primary supply current	A
I_2	.....2nd winding current	A

I_1'	.....	Primary winding current	A
I_o	.....	No load current	A
Q	.....	Reactive power of open test in	KA VR
P	.....	Active power in	kW
S	.....	Apparent power in	kVA
N_1	.....	Number of turns of primary winding	turn
N_2	.....	Number of turns of second winding	turn

List of Figures

Fig .2.1 Steady – state equation circuit for power transformer	9
Fig .2.2 Phasor diagram of simplified equivalent circuit of transformer.....	9
Fig .2.3 Open & Short circuit of the transformer test	10
Fig .3.1 Basic 6.0 will display the following dialog box.....	16
Fig .3.2 Visual Basic Environment.....	17
Fig .3.3 properties window.....	18
Fig .3.4 writes the code of program.....	19
Fig .3.5.a/b executable file for suggested program.....	19
Fig .4.1 Building drop-down menus of some forms describe the transformer	21
Fig .4.2 Splash Scream	22
Fig .4.3 Main form of the program	23
Fig .4.4 Illustrates constructions of transformer	23
Fig .4.5 Type of transformer constructions.....	24
Fig .4.6 Magnetic flux transition from point to point.....	24
Fig .4.7 Flow chart illustrating how program process in SimulatorT1.....	25
Fig .4.8 Message of error input	26
Fig .4.9 Definition of equation.....	26
Fig .4.10 Equivalent circuit	27
Fig .4.11 simulatorT3 contant	28
Fig .4.12 Input basic information data in form	29
Fig 4.13 Concept of transformer test & input adat	29
Fig .4.14 calculate transformer parameter	30
Fig .4.15 reportof transformer	31
Fig .4.16.a equivaiant circuit referred to primary	32
Fig .4.16.b eqvialent circuit referred to secondary.....	32

List of Tables

Table 4.1 Values of open circuit test	35
Table 4.2 Values of short circuit test	35
Table 4.3 Analysis of a Three-Phase 11000:433V 1000kVA Transformer.....	36
Table 4.4 Rest data voltage & power Rating	36
Table 4.5 Equivalent circuit values in ohms	39