

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF THE ELECTRICAL SERVICES
OF A MULTISTOREY BUILDING

BY: NIKOLAS TSIAKOLI LOUKITS

E.1424

ACADEMIC YEAR

2006 / 2007

HIGHER TECHNICAL INSTITUTE	PROJECT NO
	3718

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**DESIGN OF THE ELECTRICAL
SERVICES OF A MULTISTOREY
BUILDING**

BY: NIKOLAS TSIAKOLI LOUKITS

E1424

ACADEMIC YEAR
2006/2007

HIGHER TECHNICAL INSTITUTE	PROJECT NO
	3718

CONTENTS

	<u>PAGE</u>
ACKNOWLEDGEMENT	1
ABSTRACT	2
INTRODUCTION	3
CHAPTER 1:	
Illumination design	
1.1 Introduction	4
1.2 Rules for energy efficient lighting	4
1.3 Illumination definitions	5
1.4 Methods of illumination calculations	6
1.5 Procedure of the lumen method	7
1.6 Example calculations	7-8
1.7 Table of illumination calculations	9-13
CHAPTER 2:	
Lighting circuits design	
2.1 Introduction	14
2.2 Lighting circuits design procedure	14-16
2.3 Staircase switch	16-17
2.4 Typical lighting circuit calculations	18-20
2.5 Table of lighting calculations	21-22
CHAPTER 3:	
Socket outlet design	
3.1 Introduction	23
3.2 Typical ring socket outlet calculations	24-28
3.3 Typical radial socket outlet calculations	28-30
3.4 Table of socket design calculations	31-32

CHAPTER 4:	Fixed electrical appliances	
4.1	Waterheater	33-35
4.2	Washing machine	36-38
4.3	Cooker unit	39-42
4.4	Refrigerator	42-45
4.5	Dish washer	45-47
4.6	Table of fixed appliances design calculations	48-50

CHAPTER 5:	Air condition design	
5.1	Introduction	51
5.2	Theoretical calculations	51-54
5.3	Area required BTUs	54-58
5.4	Table of A/C units design calculations	58-59

CHAPTER 6:	Motor circuits design	
6.1	Lift installation	60-62
6.2	Water pump installation	63-65
6.3	Barrier gate installation	66-68
6.4	Table of motor circuits design calculations	68

CHAPTER 7:	Main supply cables and Diversity	
7.1	Introduction	69
7.2	Table with diversity application results	69
7.3	Theoretical calculations	70-71
7.4	Table of main cables and protective devices results	72

CHAPTER 8:	Single line diagrams	
8.1	Introduction	73
8.2	Single line diagrams	73-79

CHAPTER 9: Bonding and Earthing

9.1 Introduction	80
9.2 Main equipotential bonding of metal services	80
9.3 Bonding conductor	80

CHAPTER 10: Inspection and Testing

10.1 Introduction	81
10.2 Visual inspection	81
10.3 Testing	82-83
10.4 Testing steps	83-84

CHAPTER 11: Telephone/T.V/Internet/ Intercommunication access control System design

11.1 Telephone design	85-93
11.2 T.V design	94
11.3 Internet design	95
11.4 Intercommunication access control system design	95-100

CHAPTER 12: Lightning protection system design

12.1 Introduction	101
12.2 Definitions	101-102
12.3 Effects of lightning strike	102
12.4 Function of a lightning conductor	103
12.5 Need for protection	103
12.6 Down conductors	103
12.7 Zone of protection	104
12.8 Inspection and testing records	104
12.9 Evaluation of the need	105
12.10 Estimation of exposure risk	105
12.11 Calculation of overall risk factor	105-106
12.12 Calculation of air terminals number	107-108
12.13 Calculation of horizontal air termination conductor number	108-109
12.14 Calculation of down conductors number	109

CHAPTER 13:**Fire alarm system**

13.1 Introduction	110
13.2 Zones of protection	110
13.3 Zoning of manual call points	110
13.4 Zoning of fire detectors	111
13.5 Types of fire detector	111-112
13.6 Schematic diagrams of manual call points	113
13.7 Fire alarm design	114-118

CHAPTER 14:**Materials and Costing**

14.1 Introduction	119
14.2 Analytical method	119
14.3 Lighting circuits	120
14.4 Socket outlets	120
14.5 Fixed appliances	121
14.6 Air Conditioners	121
14.7 Motor circuits	121
14.8 Telephone / Internet	122
14.9 T.V	122
14.10 Intercommunication access control system	123
14.11 Fire alarm system	123
14.12 Lightning system	123-124
14.13 Distribution board	124
14.14 Protective devices	124-125
14.15 Cables	125
14.16 Conduits	126

CONCLUSIONS

127

REFERENCES

128

APPEDICES**DRAWINGS**

ACKNOWLEDGEMENT

I would like to express my thanks to my project supervisor Mr. G. Kourtellis, lecturer of the Electrical Engineering Department of H.T.I, for his guidance and assistance given to me through the project period. Furthermore I would like to express my thanks to my family for their valuable support that they gave me during my studies in H.T.I., especially through the project accomplishment period.

ABSTRACT

The purpose of this project is to provide in detailed steps the way that a proper electrical installation takes place in a multistorey building. The objective of the electrical installation is to provide safety of any possible injuries or damages that can take place due to a faulty electrical installation, as well and livestock to the user.

The whole design is based to IEE wiring regulations of 16th Edition, as well and local EAC and CYTA regulations.

In this project that is made up of several chapters so that to simplify it's study, the design of the electrical services of the multistorey building is explained in detail.

At the end of this report, appendices providing technical specifications for the devices and equipment used can be found, and eventually architectural drawings are provided showing the detailed locations of the various loads and equipment used.

INTRODUCTION

This project deals with the electrical installations and the specialized electrical services of a building with flats, including specifications, drawings and typical calculations of the design. The design of the whole electrical installations of the multistorey building is represented in this project report.

Objectives:

1. To design the complete electrical installation of a multistorey building that includes the following:
 - Illumination
 - Lighting circuits
 - Socket outlet circuits
 - Fixed appliances
 - Air-Conditioners
 - Motor circuits
 - Supply cables to the distribution boards and diversity
 - Single line diagrams
 - Bonding and earthing
 - Inspection and testing
 - Telephone/T.V./Internet/Intercommunication access control systems design
 - Lightning protection system
 - Fire alarm system
2. To provide all necessary diagrams, schedule of materials and costing including labour.