# HIGHER TECHNICAL INSTITUTE ELECTRICAL ENGINEERING DEPARTMENT

## DIPLOMA PROJECT

## DESIGN OF THE ELECTRICAL SERVICES OF A MULTISTOREY BUILDING

E/1359

### MARIOS IOSIF

JUNE 2004

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

By

#### **Marios Iosif**

Project report submitted

to the department of Electrical Engineering

of the Higher Technical Institute

Nicosia, Cyprus

in partial fulfillment of the requirements

for award of the diploma of

#### **TECHNICIAN ENGINEER**

in

#### **ELECTRICAL ENGINEERING**

Project Supervisor: Mr. G. Kourtellis

June 2004

HIGHER	PROJECT NO
TECHNICAL INSTITUTE	3515

#### **ACKNOWLEDGEMENTS**

I would like to express my deep thankfulness to all the people who helped me complete this project. Especially Mr. G. Kourtellis for his useful help and supervision during the whole process of this project.

Finally I wish to express my sincere and deep thanks to my family for their patience, understanding and support they have shown during my studies.

...

#### **ABSTRACT**

This project deals with the electrical services of a multistorey building which includes the following:

- a) Illumination design of the building.
- b) Design of the electrical installation.
- c) Design of the telephone installation and TV distribution.
- d) Design of the specialized electrical services of the building.
- e) Costing of the installation including labour.

The design is carried out according to:

- The I.E.E (16<sup>th</sup> edition) and E.A.C regulations for the electrical installation design.
- The C.I.B.S code for the illumination design.
- The CY.T.A requirements.

#### **INTRODUCTION**

The basic objectives of this project are:

1) To design the complete electrical installation of a multistorey building which includes the following.

a) Power
b) Lighting
c) Telephone and TV distribution
d) Lightning protection

2) To provide all necessary diagrams, schedule of materials and costing including labour.

### **CONTENTS**

i) Acknowledgementsii) Abstractiii) Introduction

-CHAPTER 1 ILLUMINATION DESIGN AND CALCULATIONS1
-SECTION 1 INTRODUCTION
-SECTION 2 ELECTRIC LAMPS
-SECTION 3 RULES FOR ENERGY EFFICIENT LIGHTING
-SECTION 4 DEFINITIONS AND UNITS
-SECTION 5 METHODS OF ILLUMINATION
-SECTION 6 PROCEDURE OF THE LUMEN METHOD
-SECTION 7 TYPICAL CALCULATIONS
-SECTION 8 RESULTS OF ILLUMINATION AND DESIGN
-CHAPTER 2 LIGHTING DESIGN AND CALCULATIONS7
-CHAPTER 3 SOCKET OUTLET DESIGN AND CALCULATIONS32
-CHAPTER 4 FIXED APPLIANCES AND CALCULATIONS
-SECTION 1 SPIRAL MIXERS
-SECTION 2 ELECTRIC OVENS
-SECTION 3 ELECTRIC FREEZER
-SECTION 4 POT WASHER
-SECTION 5 LIFT (GROUND FLOOR)
-SECTION 6 WATER HEATERS
-SECTION 7 ELECTRIC COOKER
-SECTION 8 AIR-CONDITIONING -HEATING UNITS
-SECTION 9 WATER PUMP
-SECTION 10 LIFT (COMMON USE)
-CHAPTER 5 DIVERSITY
-SECTION 1 DIVERSITY FOR GROUND FLOOR
-SECTION 2 DIVERSITY FOR FIRST FLOOR
-SECTION 3 DIVERSITY FOR SECOND FLOOR
-SECTION 4 DIVERSITY FOR THIRD FLOOR
-SECTION 5 DIVERSITY FOR COMMON USE
-CHAPTER 6 INSPECTION AND TESTING
-SECTION 1 INTRODUCTION
-SECTION 2 VISUAL INSPECTION
-SECTION 3 TESTING
-SECTION 3.1 CONTINUITY OF RING FINAL CIRCUIT CONDUCTORS
-SECTION 3.2 CONTINUITY OF PROTECTIVE CONDUCTORS
-SECTION 3.3 INSULATION RESISTANCE
-SECTION 3.4 POLARITY TEST

-SECTION 1 TELECOMMUNICATION NETWORK -SECTION 2 DEFINITIONS OF THE TERMS USED -SECTION 3 EARTHING -SECTION 4 TELEPHONE INSTALLATION -CHAPTER 8 BURGLAR ALARM......100 -SECTION 1 INTRODUCTION -SECTION 2 DETECTORS -SECTION 3 TYPES OF DETECTORS -SECTION 3.1 PASSIVE INFRARED DETECTORS -SECTION 3.2 MAGNETIC SWITCHES -SECTION 3.3ACOUSTIC BREAK GLASS DETECTORS -SECTION 4 CONTROL UNIT -SECTION 5 POWER SUPPLY -SECTION 6 WIRING -SECTION 7 ANTI-TAMPER -SECTION 8 SINGLE LINE DIAGRAMS -SECTION 8.1 LEGEND -SECTION 8.2 GROUND FLOOR -SECTION 8.3 FIRST & SECOND FLOOR -SECTION 8.4 THIRD FLOOR -CHAPTER 9 FIRE ALARM.....106 -SECTION 1 THEORY -SECTION 1.1 INTRODUCTION -SECTION 1.2 MANUAL FIRE ALARMS SYSTEMS -SECTION 1.3 AUTOMATIC FIRE ALARMS SYSTEMS -SECTION 1.4 FIRE DETECTORS -SECTION 1.4.1 TYPES OF FIRE DETECTORS -SECTION 1.4.1.1 HEAT DETECTORS -SECTION 1.4.1.2 SMOKE DETECTORS -SECTION 1.4.1.3 FLAME DETECTORS -SECTION 1.5 CALL POINTS -SECTION 1.6 CONTROL PANEL -SECTION 2 DESIGN/CONSTRUCTION -SECTION 2.1 INTRODUCTION -SECTION 2.2 SEPARATION OF ZONES -SECTION 2.3 SIZE AND NUMBER OF ZONES -SECTION 3 SINGLE LINE DIAGRAMS -SECTION 3.1 LEGEND -SECTION 3.2 GROUND FLOOR -SECTION 3.3 FIRST & SECOND FLOOR -SECTION 3.4 THIRD FLOOR

-CHAPTER 10 LIGHTNING PROTECTION
-SECTION 1 THEORY
-SECTION 1.1 PRINCIPAL COMPONENTS
-SECTION 1.2 EXPOSURE RISK
-SECTION 1.3 OVERALL EXPOSURE RISK
-SECTION 2 DETERMINATION OF WHETHER IS NEEDED
-SECTION 3 INSTALLATION
-CHAPTER 11 COSTING120
Conclusions124
References

Tables Drawings Appendices