HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

ELECTRICAL POWER DATA BASE

E.1319

BY: SAVVA CONSTANTINOS

JUNE 2003

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

ELECTRICAL
POWER
DATA
BASE

E.1319

BY: SAVVA CONSTANTINOS

JUNE 2003

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

ACADEMIC YEAR 2002/2003

PROJECT NUMBER: E.1319

TITLE: ELECTRICAL POWER DATA BASE

Project report submitted by
Constantinos Savva
in part satisfaction of the award
of Diploma of Technical Engineering
in Electrical Engineering of the
Higher Technical Institute, Cyprus

Student: Savva Constantinos (3EL1)
Project Supervisor: Ch Chrysafiades
External Assessor:.....

ACKNOWLEDGEMENTS

I would like to express my thanks to my project supervisor Mr Ch Chrysafiades for his guidance and assistance given throughout the project period.

I would also like to thank my family and friends who, in any way, helped me, cooperate with me and gave me courage during the whole project period.

Savva Constantinos

June 2000

CONTENTS

INTRODUCTION TO THE PROJECT

In 1882 Edison inaugurated the first central generating station in the United States. This had a load of 400 lamps each consuming 83 W. At about the same time the Holborn Viaduct Generating Station in London was the first in Britain to cater for consumers generally, as opposed to specialized loads. This scheme comprised a 60 KW generator driven by a horizontal steam engine; the voltage of generation was 100 V direct current.

The first major alternating current station in Great Britain was at Deptford where power was generated by machines of 10000 h.p. and transmitted at 10 KV to consumers in London. During this period the battle between the advocates of alternating current and direct current was at its most intense and acrimonious level. During this same period similar developments were taking place in the U.S.A. and elsewhere. Owing mainly to the invention of the transformer the advocates of alternating current prevailed and a steady development of local electricity generating stations commenced each large town or load centre operating its own station.

In a few years the generator has become a 600 MW generator and a national load in the UK of 12 GW, for which a main transmission voltage of 132 KV sufficed, increased to 25 GW necessitating a second grid at 275 KV and, within a decade, is in the region of 40 GW for which a "super - grid" of 400 KV is required.

Nowadays in Cyprus there are 3 power stations, in Vasilikos, Dhekelia and Moni. Vasilikos Power Station, with an installed capacity of 298 MW (2 x 130 MW Steam Units and 38 MW Gas Turbine Unit), generated in 2001 which corresponds to 39.3 % of the total electricity generated from the Authority's Power Stations. Dhekelia Power Station, with an installed capacity of 360 MW (6 x 60 MW Steam Units), generated in 2001 which corresponds to 50.11 % of the total electricity generated from the Authority's Power Stations. Moni Power station, with an installed capacity of 330 MW (6 x 30 MW Steam Units and 4 x 37.5 MW Gas Turbine Units), generated in 2001, which corresponds to 10.59 % of the total electricity generated from the Authority's Power Stations.

AIMS & OBJECTIVES

AIMS:

To introduce students to the engineering issues associated with Electrical Energy Supply Systems.

GENERAL OBJECTIVES:

a) Collect all data required
b) Design a CD containing study and training material for HTI students

ANALYTICAL OBJECTIVES:

On completion of this subject the students should be able to:

a) Describe and compare the major types of power generating plants

b) Describe the structure and components of power systems

c) Perform base electrical power system calculations involving power and energy requirements, overall cost of generation and transmission lines problems.

d) Describe different system disturbances and their solutions

e) Describe renewable energy sources

f) Describe power transmission systems

g) Describe interconnected systems

h) Explain how power balance is achieved

i) Derive the power-angle equation

j) Describe equal-area criterion for stability

k) Describe transmission line faults

l) Describe practical methods in order to improve stability

TERMS AND CONDITIONS

a) The Data Base should provided information relating to a specific course

b) A CD containing the work should be submitted with the report