H. T. I.

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

DESIGN OF AN AIRCONDITIONING SYSTEM FOR A HOTEL

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DESIGN OF AN AIR CONDITIONING SYSTEM FOR A HOTEL

by

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Project Report

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THIS PROJECT IS DEDICATED

TO MY FAMILY AND MY FIANCEÉ

FOR HAVING OFFERED ME SO MUCH

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SUMMARY

The aim of this project is to design the Air Conditioning System for a block of apartments consist of a ground floor of eleven flats, a bar, a multi purpose room and a living room, a first floor of eleven flats and a gym and a second floor of eleven flats.

In the procedure of this project, calculations of the U-Value for the walls, roof, floor and windows were performed. Also the calculations for the cooling and heating loads were performed using the E20-II (Carrier) computer program.

Then the system selection, selection of equipment and pipe sizing were performed. The technical specifications of materials and equipment followed and finally the preparation of the preventive maintenance and cost analysis.

All these are included in this project with the working drawings of the building.

INTRODUCTION

The science of air-conditioning may be defined as that of supplying and maintaining a desirable internal atmospheric condition irrespective of external conditions.

Full air conditioning implies the automatic control of an atmospheric environment either for the comfort of human beings or animals or for the proper performance of some industrial or scientific process. The adjective "full" demands that the purity, movement, temperature and relative humidity of the air be controlled, within the limits imposed by the design specification. Full air conditioning requires different treatments according to climate, latitude and season, but in general it involves:

a) In **winter**: A supply of air which has been cleaned and warmed. As the warming lowers the relative humidity, some form of humidifying plant, such as spray washer with preheater and main heater whereby the humidity is under control, is generally necessary.

b) In **summer**: A supply of air which has been cleaned and cooled. As the cooling increases the relative humidity, some form of dehumidifying plant is essential. This dehumidifying is generally accomplished by exposing the air to cold surfaces or cold spray, whereby the excess moisture is condensed and the air is left saturated at lower temperatures. The temperature of the air has then to be increased, to give a more agreeable relative humidity. This can be done by warming or by mixing with air which has not been cooled.

The essential feature of air conditioning is that it aims to produce an environment which is comfortable to the majority of the occupants. The ultimate in comfort

can never be achieved but the use of individual automatic control for individual rooms helps considerably in satisfying most people.

Equipment can be classified in three groups:

(1) All-air systems

(2) Unitary or packaged systems

(3) Air-water systems

In the air-conditioning industry the design Engineer has to consider the energy conservation as a vital factor. Energy shortages threaten to become more severe with each passing year. The cost of fuel and electricity, along with possibility of not having enough energy at any cost, is a real problem for the air-conditioning industry.

One of the most effective ways of reducing overall energy consumption for both winter and summer air conditioning is to minimise heat transmission (summer) and losses (winter) by improved standards of insulation.

Another way is to make sure that all heating and cooling equipment are operating efficiently, at or near the design levels.

The building under investigation is a hotel apartment in Paphos consist of eleven apartments in the ground floor, first floor and second floor, and a bar, a living room and a multi purpose room in the ground floor and also a gym in the first floor.

The architectural drawings were given and also the outdoor design conditions were obtained from the Meteorological Service.

For the estimation of the air-conditioning load, the following design conditions were used:

Ambient Conditions

Summer	40°C d.b.	70% rh
Winter	0°C d.b.	60% rh

Internal Conditions

Summer	25°C d.b.	50% rh
Winter	20°C d.b.	50% rh