

**DIPLOMA IN MECHANICAL ENGINEERING  
EM 110**

**KJP 365  
FINAL PROJECT**

**AIR-CONDITIONING SYSTEM DESIGN  
For Blok Kayu**

**PREPARED BY:**  
AZHAR B SHAMSUDIN  
(2000416939)

MOHD SHARIZAN B MOHD MUNER  
(2000416793)

**SUPERVISOR:**  
IR HJ.ZULKIFLI B RASID

**MEI 2003**

## Content

### Section 1

Preface	2
Objective	3
Appreciation	4

### Section 2

Design consideration	6
Design calculation	8

#### The manual

Air – conditioning load estimate	11
Solar heat gains	16
Transmission heat gain	24
Internal heat	25
Outside air	27
Selection of Air- conditioning equipment and system	33
Inspection of Air-conditioning system	42

### Section 3

Introduction of the project	47
Plan elevations	51
Project information	53
Calculation	
Heat load	54
Horse power requirement	57
Duct size	58
Result	58

### Section 4

Selected Air -conditioning unit	
Central package unit	62
Separate unit system	65
Estimate cost	66
Conclusion	69

Reference	70
-----------	----

### Appendix

## PREFACE

The Final Year Project is a compulsory paper for all students taking Diploma in Mechanical Engineering. It covers all what student had learned in semester 4 and 5. It combines all subjects that they had learned like Design, Physics, Thermodynamic, Fluid and Building Services.

To complete this paper, student work in group of two. They work together to complete this project. They can start this project in the early third year or semester 6, no class to attend but each group must has one lecturer to give an idea and consultancies of the types of project that we are doing. That mean, we have one year and many time to set up this project. All the working papers about this project are to be presented and submitted at the end of final semester after the final examination. Each group has a supervisor or lecturer to guide them in preparing and completing this project. For our group, we choose Mr. IR. HJ ZULKIFLI as our lecture to set up our goal for completing this project. This is because we are confident to work and cooperate with him. He also has many experiences about our topic that we have chosen before. So that it easy for we to seek the information about this topic.

Our final year project is Air-Conditioning system for the Blok Kayu (BK), lecture room and a place where the student do the revision study. Student doing this Final Year Project, gain a lot of benefit and advantages because it exposes them to the actual working condition when they graduate later. We choose air-conditioning system for the Blok Kayu because this will give us the first hand experience in designing due to the size of this place.

## OBJECTIVE

The main objective for this Final Project is to complete our Diploma Level at University Technology Mara as this is the requirement for our program and it carries 4 credit hour.

Other objective is for us to learn in detail about air-conditioning system. In Building Services course we just learn main subject, but the Final Year Project deals with details such as calculating air-conditioning heat load right through estimating cost. We treat this like a real job for an engineer.

This Final Project also exposes student to the problems in engineering field and the right approach to solve the problems. When they work later, they can apply the knowledge that they have learned as in actual engineering works.

Lastly this final project gives use an experience to develop our creativities and report writing in the field of Mechanical Engineering.

## DESIGN CONSIDERATIONS

### **1) BUILDING ORIENTATION**

The architect already sets the orientation of the building and calculation is based on the preset orientation as such that most of the windows are north and south direction. (See the plan). In our project, we are design air-conditioning system at Blok Kayu (BK), Block C. Base on our research and measuring the size of BK at Block C, we estimate all the size room at another block, such block A and B are same. This is because, all the BK have a same number of classroom and all the design construction are likely same.

### **2) ZONING**

The BK room are divided into block A, block B and block C. In our project, we just design at block C, and we assume other blocks are same. This block has 5 class room not included toilet. Each classroom maximum contains about 56 students in one time. So, at the certain time, this block can be used about 280 people. But, by the law of design, we must estimate the value more than that we needed.

### **3) HOUR OF OPERATION OCCUPANCY**

The rate of occupancy taken to be fairly uniform since the building uses to be lecturing or studying. The load due the occupants is taken as steady and as auditorium or theatre. This building is uses everyday especially when the lecturing time from 8.00 am till 6.00 pm, from Monday to Friday. At the night, students also use this building to do their revision study or meeting.