1. OBJECTIVES

1. To iterate the fundamental principles of air conditioning system.
2. To familiarise the basic layout of a air conditioning system with a cooling and dehumidication process.
3. To identify the components in air conditioning system.
4. To get familiar with cooling and dehumidication process.
5. To illustrates the cooling and dehumidification process on Psychrometric Chart.
6. To learn about the planning of a measurement series, the reading of measurement results and the conversion of measurements into a statement of theoretical principle.

2.THEORY

Air Conditioning, which may be described as the control of the atmosphere so that a desired temperature, humidity, distribution and movement are achieved, is a rapidly expanding activity throughout the world. Usually, cooling and dehumidification process is used in air conditioning system. Cooling is a heat removable process from close space to others in other to reduce and maintain the space temperature while dehumidification is a moisture removable process from the air without change in its dry bulb temperature. Cooling and dehumidification process has been presented as Psychrometric Chart below:

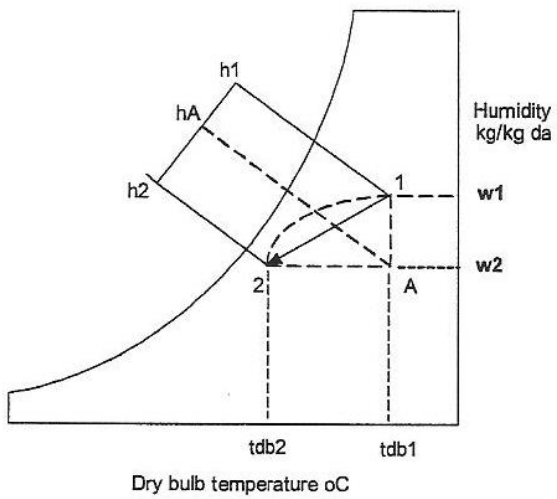

Figure 1- The psychrometric chart of cooling and dehumidification process.

The actual process in psychrometric chart is shown by dotted line from 1 to 2. In practical purposes, the end points are important. Thus, dehumidification is shown by line 1A and cooling process is shown by line A2. Total heat removed during the process:

$$Q = h_2 - h_1 \tag{1}$$

3.APPARATUS

P.A. Hilton Air Conditioning Laboratory Unit (A660) - Apparatus for Demonstrating Air Conditioning System

Figure 2 – A660 Apparatus.

4.PROCEDURES

A. Cooling Process Experiment in Enviromental Chamber

1. To ensure the water supply has been turn on and the experiment components in good condition.

2. Turn on all electrical switches of A660 apparatus.

3. Turn on computer which located the software of P.A. Hilton Data Loggers.

4. To ensure the air volume control in three different stages and they are 0%, 50% and 100%.

5. Adjust fan control to minimum level (110V).

6. Turn on compressor and let the compressor running for 10 minutes in order to stabilize the system.

7. Read and record reading on each 5 minutes for 5 different reading (1 reading for each 5 minutes and take average against the 5 different reading).

B. Dehumidification Process Experiment in Enviromental Chamber

1. To ensure the water supply has been turn on and the experiment components in good condition.

2. Turn on all electrical switches of A660 apparatus.

3. Turn on computer which located the software of P.A. Hilton Data Loggers.

4. To ensure the air volume control in three different stages and they are 0%, 50% and 100%.

5. Adjust fan control to minimum level (110V).

6. Turn on compressor and let the compressor running for 10-15 minutes in order to stabilize the system.

7. Read and record reading on each 5 minutes for 5 different reading (1 reading for each 5 minutes and take average against the 5 different reading).

5.EXPERIMENTAL DATA (ENVIROMENTAL CHAMBER)

Table 1 Experimental Data from Cooling Process with 0% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Table 2 Experimental Data from Cooling Process with 50% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Table 3 Experimental Data from Cooling Process with 100% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Table 4 Experimental Data from *cooling & Dehumidification* Process with 0% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Table 5 Experimental Data from cooling & Dehumidification Process with 50% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Table 6 Experimental Data from cooling & Dehumidification Process with 100% Air Volume Control

Flow rate:_____(g/s)

AREA	Dry Bulb-Avg (^{0}C)	Wet Bulb-Avg (^{0}C)	Relative Humidity (%)	Humidity Ratio (g/kg~air)	Enthalpy (kJ/kg)
A					
B					
C					
D					
E					
F					

Noted: All value of relative humidity, humidity ratio and enthalpy are refering to psychrometric chart.

6.EXPERIMENTAL RESULTS (ENVIROMENTAL CHAMBER)

1. Plot the graph of relative humidity vs area for cooling and dehumidification process.

2. Plot the graph of humidity ratio vs area for cooling and dehumidification process.

3. Plot the 6 area (A, B, C, D, E, F) in the psychrometric chart