Document No : UniKL MFI_SD_AC41
Revision No: 02
Effective Date: 01 December 2008

CONFIDENTIAL

SET B

UNIVERSITI KUALA LUMPUR

MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION

JANUARY 2010 SEMESTER

SUBJECT CODE	:	FCB 40203
SUBJECT TITLE	:	INTRODUCTION TO CONDITIOING OF AIR
LEVEL	:	BACHELOR
DURATION	:	2 HOURS
DATE / TIME	:	4 May 2010 8.00 PM – 10.00 PM

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. Answer all questions in English.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR (4) questions only.

Please use the answer booklet provided.

Question 1

1.1 What is sensible heat? How is the sensible heat loss from human body affected by the.

(a) Skin temperature.

(5 marks)

(b) Environment temperature

(5 marks

1.2 Define term PMV and using the graph below, determine the required PMV so that the PPD would not exceed 15% of the occupants of a building. (5 marks)
(5 marks)

1.3 Determine the PMV value for a level of activity of 1.2 met and clothing thermal resistance value of 1 clo at a temperature 21°C and the air velocity < 0.5 m/s. Evaluate the PMV with the relative humidity of 70% and 40%?
(10 marks)

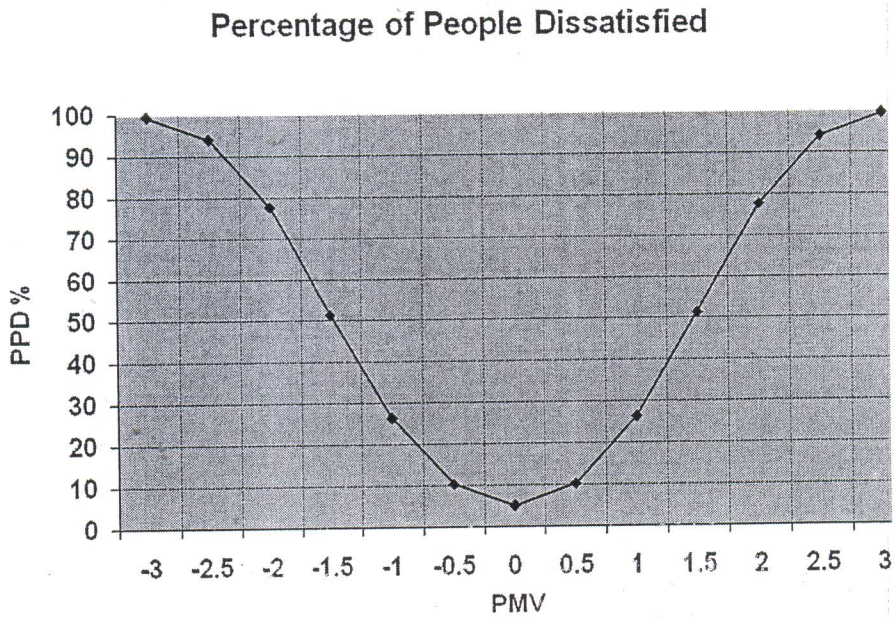

Figure 1

Question 3

An evaporator has an entering condition of 32°C DB and 27°C WB. The ratio of outside and inside surface area (A_o/A_i) is 10, h_c = 55 W/m^2.K, h_r = 2500 W/m^2.K, Cp = 1.02 kJ/kg and t_r = 5°C. Calculate the:

(a) temperature of wetted surface?

(15 marks)

(b) enthalpy of wetted surface?

(10 marks)

Metal and water film on the air side equation.

$$\frac{t_i - t_r}{h_a - h_i} = \frac{h_c}{c_p h_r} \frac{A}{A_i} = R$$

The enthalpy of saturated air h_i *is* a function of the temperature of wetted surface t_i.

$$h_i = 9.3626 + 1.7861 t_i + 0.01135 t_i^{\,2} + 0.0009855 t_i^{\,3}$$

Newton-Rapshon equation

$$x_{new} = x_{old} - \frac{f}{df/dx}$$

Question 5

A variable air volume air conditioning system with turndown ratio of 2.5 : 1 attempts to maintain two zones in a building at 24°C with an 8 K temperature difference between the room and supply air. The air leaving the cooling coil has a specific humidity of 0.0076 and there is a temperature rise across the fan 2 K. Details the design heat gain are as follows

Zone	Maximum Sensible gain (kW)	Maximum simultaneous Sensible gain (kW)	Constant Latent heat (kW)	Minimum fresh air (kg/s)
A	100	30	16	0.64
B	100	100	16	0.82

The external design state is 33°C DB and 24°C WB, calculate:

a) The ratio of re-circulated to fresh air.

(5 marks)

b) The temperature and percentage saturation in each zone during maximum simultaneous gains.

(5 marks)

c) The cooling coil contact factor.

(5 marks)

d) The maximum cooling coil load.

(5 marks)

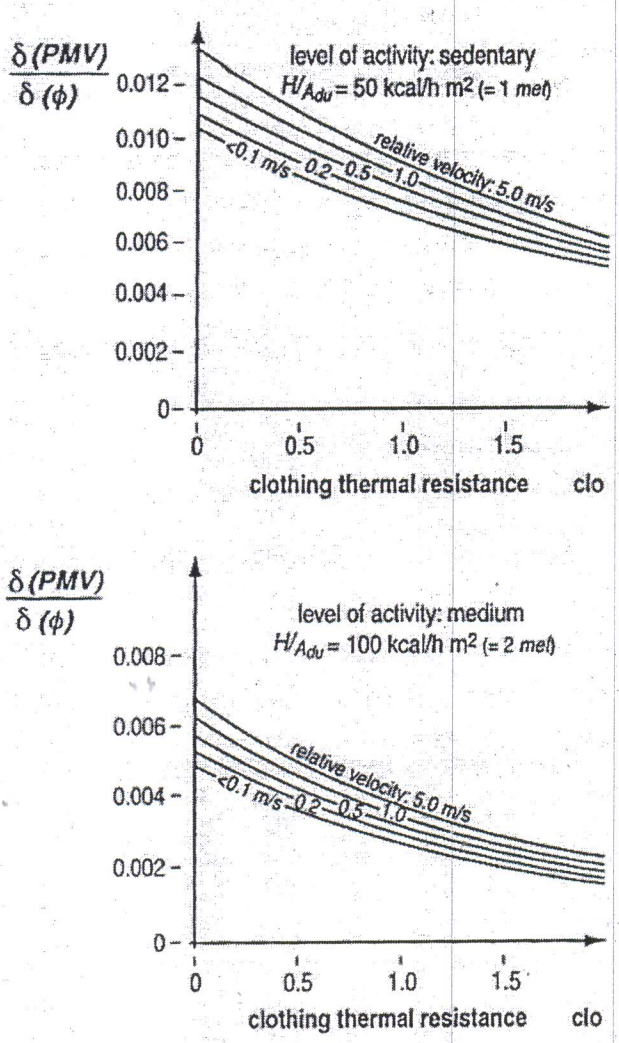

Fig. 4.7 Influence of the relative humidity ϕ on the PMV according to the clothing for different air velocities (levels of activity 1 and 2 met)