

มหาวิทยาลัยสงขลานครินทร์

คณะวิศวกรรมศาสตร์

การสอบปลายภาค ประจำปีการศึกษาที่ 1

วันที่ 1 ตุลาคม 2546

วิชา 216-433 Refrigeration & air conditioning

ประจำปีการศึกษา 2546

เวลา 13.30-16.30 น.

ห้อง R 201, R 205

คำสั่ง

- ข้อสอบมีทั้งหมด 5 ข้อ ให้ทำทุกข้อ

รศ.กำพล ประทีปชัยกูร

ผู้ออกข้อสอบ

- 1) A refrigerant 22 vapor compression system includes a liquid to suction heat exchanger in the system. The heat exchanger warms saturated vapor coming from the evaporator from -10°C to 5°C with liquid which comes from the condenser at 30°C . The compressions are isentropic. Calculate the coefficient of performance of the system. (20 คะแนน)

- 2) Given the conditions of a counter flow cooling tower

$$\text{Water flow rate} = 10,000 \text{ lb/hr}$$

$$\frac{m_w}{m_{da}} = 1.1$$

$$\text{inlet air wet bulb temperature} = 75^{\circ}\text{F}$$

$$\text{range} = 8^{\circ}\text{F}$$

$$\text{approach} = 6^{\circ}\text{F}$$

$$c_{pw} = 1 \frac{\text{Btu}}{\text{lb}^{\circ}\text{R}}$$

Divide the cooling tower into 4 layers in which the temperature difference in each layer is equal to 2°F . Calculate the heat transfer in the cooling tower. (20 คะแนน)

- 3) A room within a building has a latent heat gain of $40,000 \frac{\text{Btu}}{\text{hr}}$ and a sensible heat gain of $100,000 \frac{\text{Btu}}{\text{hr}}$. The outdoor design conditions of air are at 90°FDB and 75°FWB and the indoor design conditions are maintained at 80°FDB and $50\% \text{RH}$. $1,800 \text{ cfm}$ of outside air is used for ventilation. Calculate the outdoor air heat load, effective sensible heat ratio. Given bypass factor 0.2 (20 คะแนน)

- 4) Calculate the cooling load from occupants in a factory at 3.00 pm. The details of the activity and time occupied by the occupants are as followed:

150 workers have light machine work entering the factory at 8.00 am and leaving the factory at 4.00 pm.

200 workers have heavy work entering the factory at 9.00 am and leaving the factory at 3.00 pm.

(20 คะแนน)

- 5) Select the round duct size and calculate the total pressure loss in every duct line as shown by using the equal friction method. Given the total air flow rate coming from the plenum is 1,000 cfm and the pressure loss in each diffuser is 0.02 in.wg. Using the initial velocity in the main duct right after the plenum at 1,400 fpm. Find the static pressure at the fan exit. The diffusers are all rectangular shape.
- (20 คะแนน)

