

# 國立臺北科技大學 103 學年度碩士班招生考試

系所組別：1410 能源與冷凍空調工程系碩士班甲組

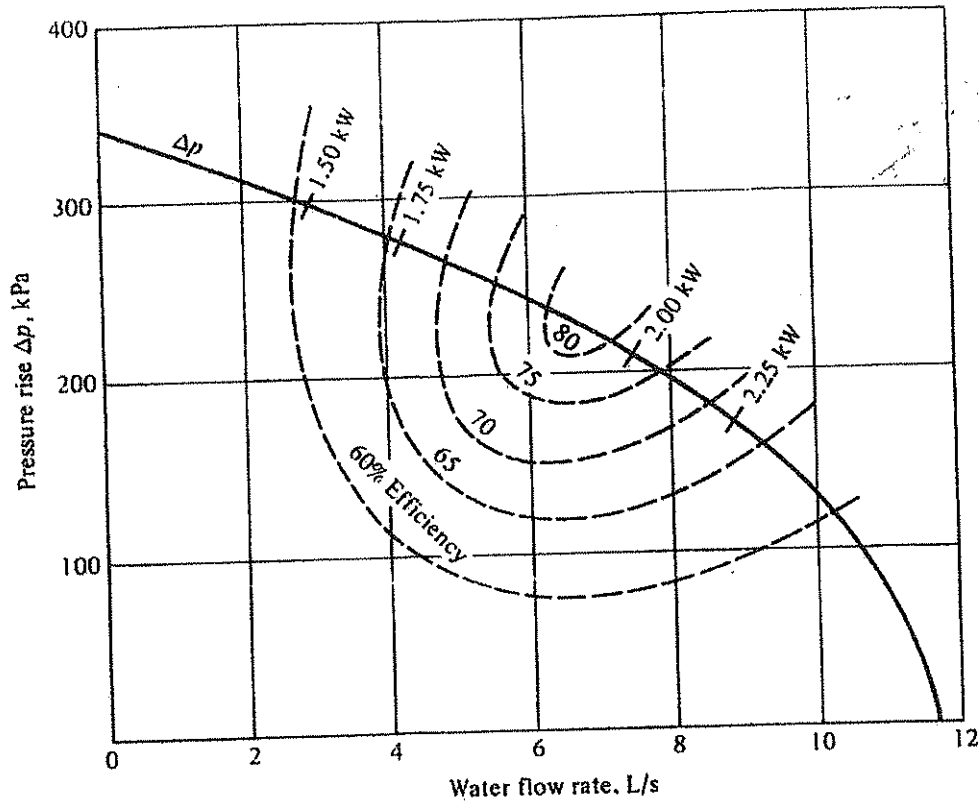
## 第三節 冷凍空調原理 試題

第一頁 共二頁

### 注意事項：

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

- (1)(25%) A cooling tower is a device that cools a spray of water by passing it through a stream of air. If  $15 \text{ m}^3/\text{s}$  of air at  $35^\circ\text{C}$  dry-bulb and  $24^\circ\text{C}$  wet-bulb temperature and an atmospheric pressure of 101 kPa enters the tower and the air leaves saturated at  $31^\circ\text{C}$ .
- (a) (15%) To what temperature can this airstream cool a spray of water entering at  $38^\circ\text{C}$  with a flow rate of 20 kg/s.
- (b) (10%) How many kilograms per second of makeup water must be added to compensate for the water that is evaporated?
- (2)(25%) A laboratory space to be maintained at  $24^\circ\text{C}$  and 50 percent relative humidity experiences a sensible-cooling load of 42 kW and a latent load of 18 kW. The air-conditioning system is equipped for reheating the air leaving the cooling coil. The cooling coil has been selected to provide outlet air at  $9.0^\circ\text{C}$  and 95 percent relative humidity. Please find:
- (a) (10%) The temperature of supply air,
- (b) (15%) The airflow rate.
- (3) (15%) The motor driving a fan is rated at 15 A (Ampere) and is currently drawing 11 A while providing a rotative speed of the fan of 15 r/s. The airflow rate delivered by the fan is to be increased as much as possible.
- (a) (8%) What is the permissible rotative speed of the fan while staying within the rating of the motor?
- (b) (7%) What percentage increase in airflow rate is possible?
- (4) (15%) Using the efficiency curves shown below for one kind of pump, compute the power required by the pump when the water flow rate is 6 L/s.



Performance characteristics of a centrifugal pump in Prob. (4)

- (5) (20%) At one particular moment the heating capacity of a water-to-water heat pump is 250 kW, with COP of the refrigeration unit 3.2. The chilled water flows to an air-handling unit with rate of supply air 36 kg/s and a supply temperature 13 °C.
- (a) (10%) What is the power input?
- (b) (10%) What should the supply air temperature of the AHU be, assuming only sensible cooling in the coil?

注意：背面尚有參考資料。

**ASHRAE PSYCHROMETRIC CHART NO. 1**

NORMAL TEMPERATURE  
SEA LEVEL  
BAROMETRIC PRESSURE 101.325 kPa.



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