題號： 346
科目：熱力學(D)
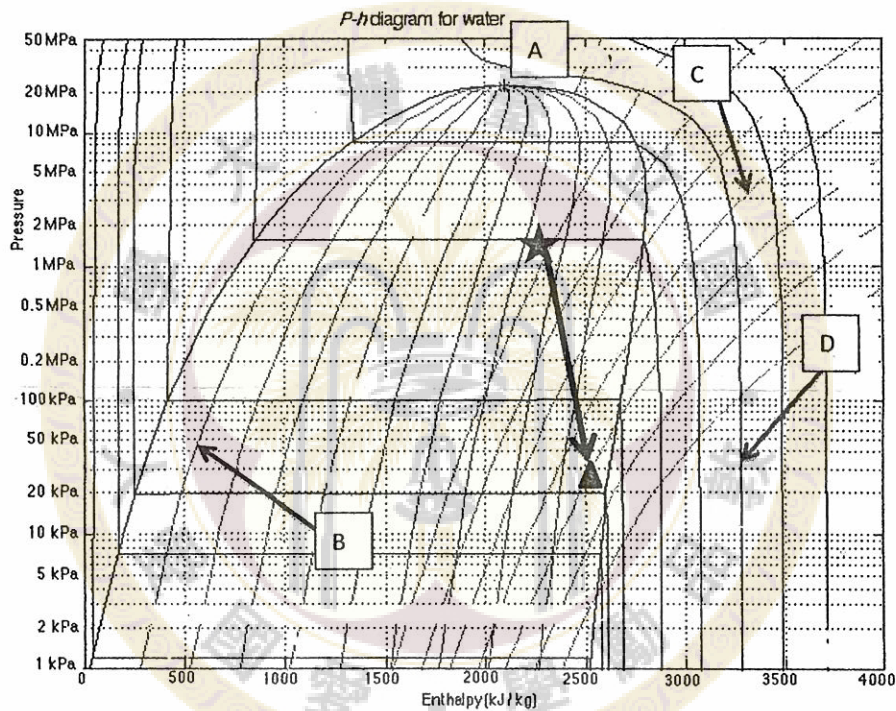節次： 4

國立臺灣大學101學年度碩士班招生考試試題

題號： 346
共 3 頁之第 1 頁

1. **(18%)** Terminology explanation:

What are the difference between compressors, pumps and fans? (6%)

What is equation of state? What is state postulate? (6%)

What is specific volume? What is specific humidity? (6%)

2. **(20%)** P-h diagram for water is shown below. Please answer the following questions.


P-h diagram for water

a. What is the point A? its name and short explanation (5%).

b. What property does those isolines around B stand for? (3%)

c. What property does those isolines around C stand for? (3%)

d. What property does those isolines around D stand for? (3%)

e. Indicate the changing of **pressure, internal energy, temperature, specific volume, entropy, and quality,** if a process moving shown as the arrow, from star to triangle.

Ex: P +, -, =, or n/a (not available) (6%)

見背面

題號： 346
科目：熱力學(D)
節次： 4

國立臺灣大學101學年度碩士班招生考試試題

題號： 346
共 3 頁之第 2 頁

3. **(22%)** A tank of volume V is to be filled with an ideal gas. Initially the tank is at P_1 and T_1. The port is regulated with a valve and its properties are constantly at T_{in}. The charging process is adiabatic.
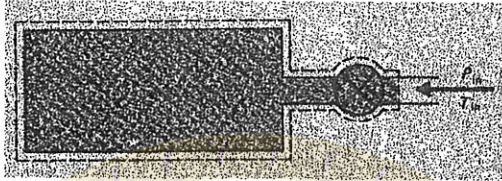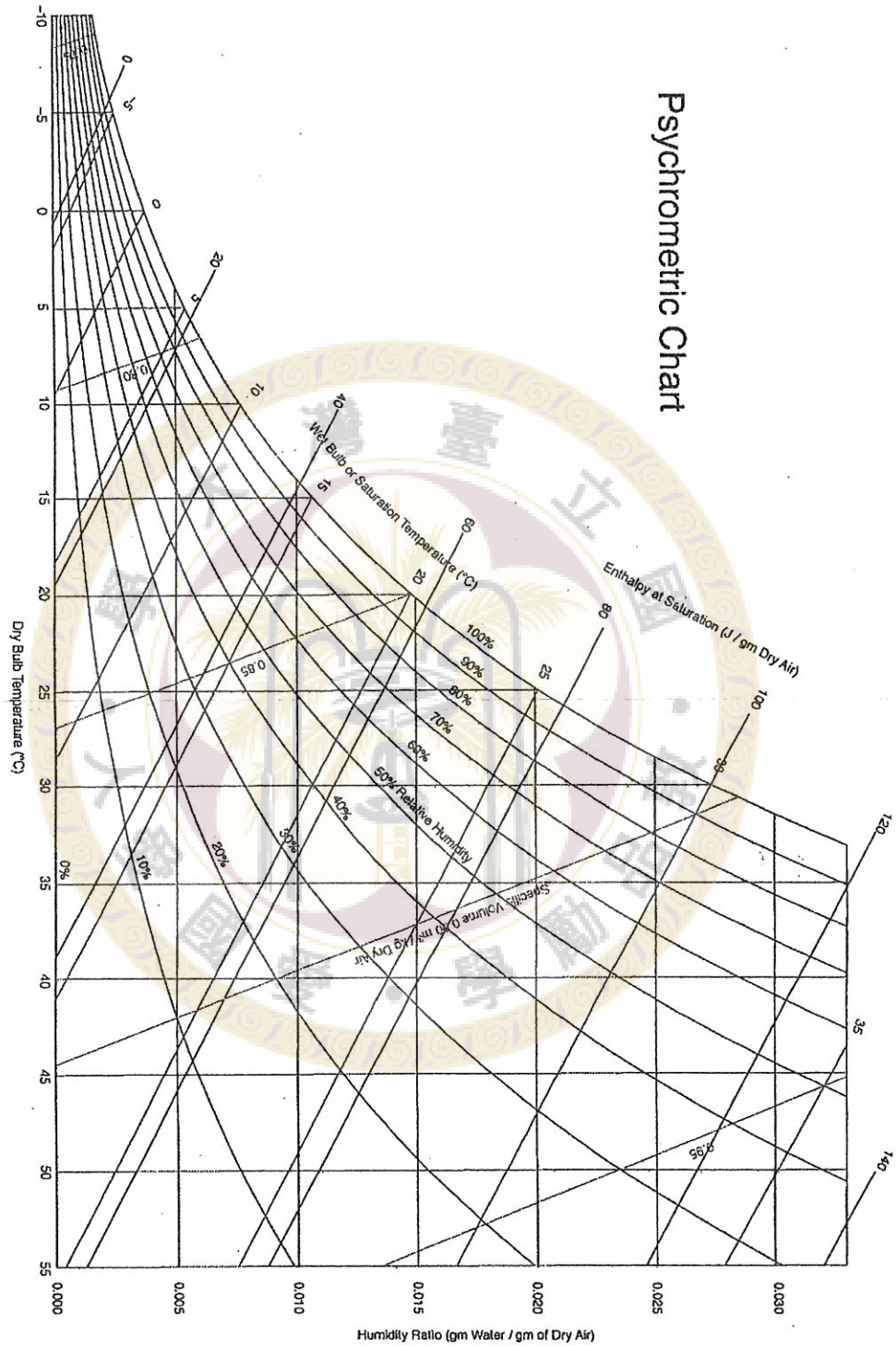

   a. Write down the equation for conservation of mass (3%)
   b. Write down the equation for conservation of energy (3%)
   c. Determine the final temperature T_2 to obtain P_2. (12%)
   d. Derive the relation between T_2 and T_{in} if P_2 is much greater than P_1 (4%).

4. **(25%)** Air at 30°C and 60% relative humidity is cooled to 15°C by passing the cooling coils. Using psychrometric chart (on page 3), determine the psychrometric properties (dry-bulb temperature, wet-bulb temperature, dew point temperature, relative humidity, humidity ratio, specific volume, and enthalpy)of the air after it cooled (12%), the sensible and latent heat removed (8%), and the water vapor condensed per kg of dry air (5%).
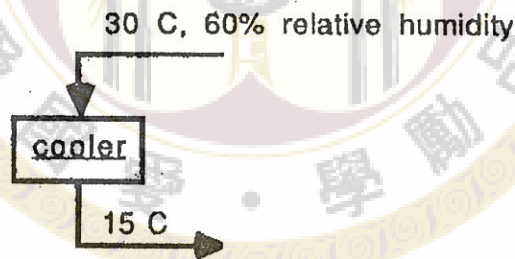
5. **(15%)** Compare Otto and Diesel engines and answer the following questions.
   a. Draw the two cycles on a P-v diagram (6%).
   b. On the P-v diagram, indicate the area representing the work output (3%).
   c. List 3 major differences between the two engines (6%).

接次頁

題號： 346
科目：熱力學(D)
節次： 4
國立臺灣大學101學年度碩士班招生考試試題
題號： 346
共 3 頁之第 3 頁

Psychrometric Chart

試題隨卷繳回