

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

考試日期：0301，節次：1

1. Please explain the following terminologies in thermodynamics: (25%)
  - a. Quasi-equilibrium process (4%)
  - b. reversible work (4%)
  - c. entropy (4%)
  - d. exergy (5%)
  - e. Clapeyron equation (4%)
  - f. partial molar property (4%)
2. Air is compressed adiabatically from 1 bar and 27°C to 10 bars in a piston cylinder device with air of 10 kg. Please determine the power input required and the final temperature reached for a reversible process (assume that  $c_p$  and  $c_v$  of air are constant and = 1 kJ/kg°K, 0.717 kJ/kg°K). (25%)
3. One kilogram of air in a rigid insulated tank is initially at  $P_1 = 1$  bar and  $T_1 = 300^\circ\text{K}$ . The air is stirred by a paddle wheel until its temperature is 400°K. Please determine a) the actual work done and b) the minimum work done. (25%)
4. An insulated tank is divided into two compartments by a partition. One compartment contains 2 kmol of  $\text{CO}_2$  at 27°C and 200 kPa, and the other compartment contains 3 kmol of Ar gas at 47°C and 400 kPa. Now the partition is removed and the two gases are allowed to mix. Please determine the final T and P of the mixture and 2) the entropy changes during the process. Assume that the  $c_p$  and  $c_v$  of  $\text{CO}_2$  are constant and equal 0.846 kJ/kg°K, 657 kJ/kg°K;  $c_p$  and  $c_v$  of Ar are also constant and equal 0.52 kJ/kg°K, 0.31 kJ/kg°K respectively. Both gases are assumed as ideal gas. (25%)