淡江大學九十一學年度碩士班招生考試試題

系別：機械與機電工程學系　　　科目：熱　力　學

准帶項目註明「○」否則打「×」	
計算機	字典
○	×

1. Please give definitions of the following (30%)

   (1) Availability

   (2) Otto cycle

   (3) Dew point

   (4) Wet-bulb temperature

   (5) Principle of increase of entropy

   (6) Stagnation property

   (7) Quasiequilibrium process

   (8) Isentropic process

   (9) Throttling process

   (10) Inequality of Clausius

2. Can the ideal-gas relation $du = c_v \, dT$ be applied to a constant-pressure process, or is it restricted to a constant-volume process? Explain. (10%)

3. Please plot and explain the $P\text{-}v$ and $T\text{-}s$ diagram for the Stirling cycle. (15%)

4. Derive the relation $c_p - c_v = R$　for ideal gases (10%)

5. A refrigeration cycle operating between two reservoirs receives energy Q_C from a cold reservoir at $T_C = 250K$ and rejects energy Q_H to a hot reservoir at $T_H = 300K$. For each of the following cases determine whether the cycle operates reversibly, irreversibly, or is impossible: (20%)

   (1) $Q_C = 1000KJ$, $W_{cycle} = 250 \, KJ$

   (2) $Q_C = 1000KJ$, $Q_H = 1150KJ$

   (3) $Q_H = 1150KJ$, $W_{cycle} = 250 \, KJ$

   (4) β (coefficient of performance) $= 5.1$

6. Heat transfer occurs between two thermal energy reservoirs at temperatures of 300 and 1000 K. Treating the two thermal energy reservoirs plus the region through which the heat transfer occurs as a single closed system, determine (a) the rate of entropy production and (b) the rate of entropy change, in kJ/(K · min), for the system if the heat transfer rate between the two reservoirs is 1000 kJ/min. (15 %)