淡江大學九十四學年度轉學生招生考試試題

系別：機械與機電工程學系三年級　科目：熱　力　學

准帶項目請打「V」	
V	簡單型計算機

節次：7 月 13 日第 5 節

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本試題雙面印製

1. Explain the following thermodynamic terms:
   (1) internal energy
   (2) entropy
   (3) enthalpy
   (4) superheated vapor
   (5) exergetic efficiency

(15%)

2. Explain the first law of thermodynamics and the second law of thermodynamics.

(15%)

3. Explain the following thermodynamic cycles:
   (1) power cycle
   (2) refrigeration cycle
   (3) heat pump cycle
   (4) Otto cycle
   (5) Diesel cycle

(15%)

4. Answer the following true or false. If false, explain why.
   (1) A process that violates the second law of thermodynamics violates the first law of thermodynamics.
   (2) When a net amount of work is done on a closed system undergoing an internally reversible process, a net heat transfer of energy from the system also occurs.
   (3) A closed system can experience an increase in entropy only when irreversibilities are present within the system during the process.
   (4) In an adiabatic and internally reversible process of a closed system, the entropy remains constant.
   (5) The energy of an isolated system must remain constant, but the entropy can only decrease.

(15%)

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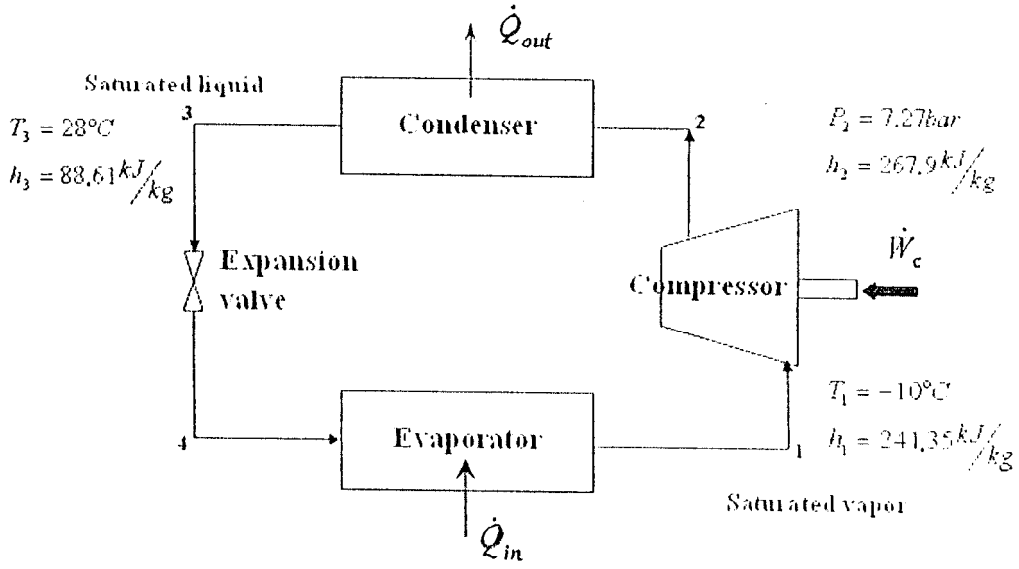
5. An ideal vapor-compression refrigeration cycle (as shown) operates at steady state with Refrigerant 134a as the working fluid. Saturated vapor enters the compressor at −10℃, and saturated liquid leaves the condenser at 28℃. The mass flow rate of refrigerant is 5 kg/min. Determine
   (a) the compressor power, in kW.
   (b) the refrigerating capacity, in tons.
   (c) the coefficient of performance.

(20%)



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6. Steam is the working fluid in an ideal Rankine cycle as shown. Saturated vapor enters the turbine at 8.0MPa and saturated liquid exits the condenser at a pressure of 0.008MPa. The net power output of the cycle is 100MW. Determine for the cycle (a) the thermal efficiency, (b) the back work ratio, (c) the mass flow rate of the steam, in kg/h, (d) the rate of heat transfer, $\dot{Q}_{in}$, into the working fluid as it passes though the boiler, in MW, (e) the rate of heat transfer, $\dot{Q}_{out}$, from the condensing steam as it passes through the condenser, in MW.
(Hint：h_1=2758.0 kJ/kg, h_2=1794.8 kJ/kg, h_3=173.88 kJ/kg, h_4=181.94 kJ/kg) (20%)