淡江大學九十四學年度碩士班招生考試試題 84

系別：機械與機電工程學系　　科目：熱　力　學

准帶項目請打「V」	
V	簡單型計算機

本試題共 2 頁

本試題雙面印製

1.Explain the following thermodynamic terms :
(1) internal energy,
(2) entropy,
(3) exergy,
(4) specific heat,
(5) dew point temperature.

(15%)

2.Using the temperature-entropy diagrams to explain the following thermodynamic cycles :
(1) Carnot power cycle,
(2) Carnot refrigeration cycle,
(3) ideal Rankine cycle,
(4) air-standard Otto cycle,
(5) air-standard Diesel cycle.

(15%)

3.Draw a schematic diagram (簡圖) and explain the following thermodynamic components :
(1) heat engine,
(2) heat pump,
(3) turbine,
(4) nozzle,
(5) diffuser.

(15%)

4.What are the definitions of humidity ratio and relative humidity. By using a schematic diagram, try to design a dehumidifier (除濕機).

(15%)

5. A gas undergoes a thermodynamic cycle consisting of three processes :
Process 1—2 : constant volume, $V = 0.028\ m^3$, $U_2 - U_1 = 26.4\ kJ$
Process 2—3 : expansion with $pV =$ constant, $U_3 = U_2$
Process 3—1 : constant pressure, $p = 1.4\ bar$, $W_{31} = -10.5\ kJ$
There are no significant changes in kinetic or potential energy.
(1) Sketch the cycle on a p—V diagram.
(2) Calculate the net work for the cycle, in kJ.
(3) Calculate the heat transfer for process 2—3, in kJ.
(4) Is this a power cycle or a refrigeration cycle ?

(20%)

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31-2

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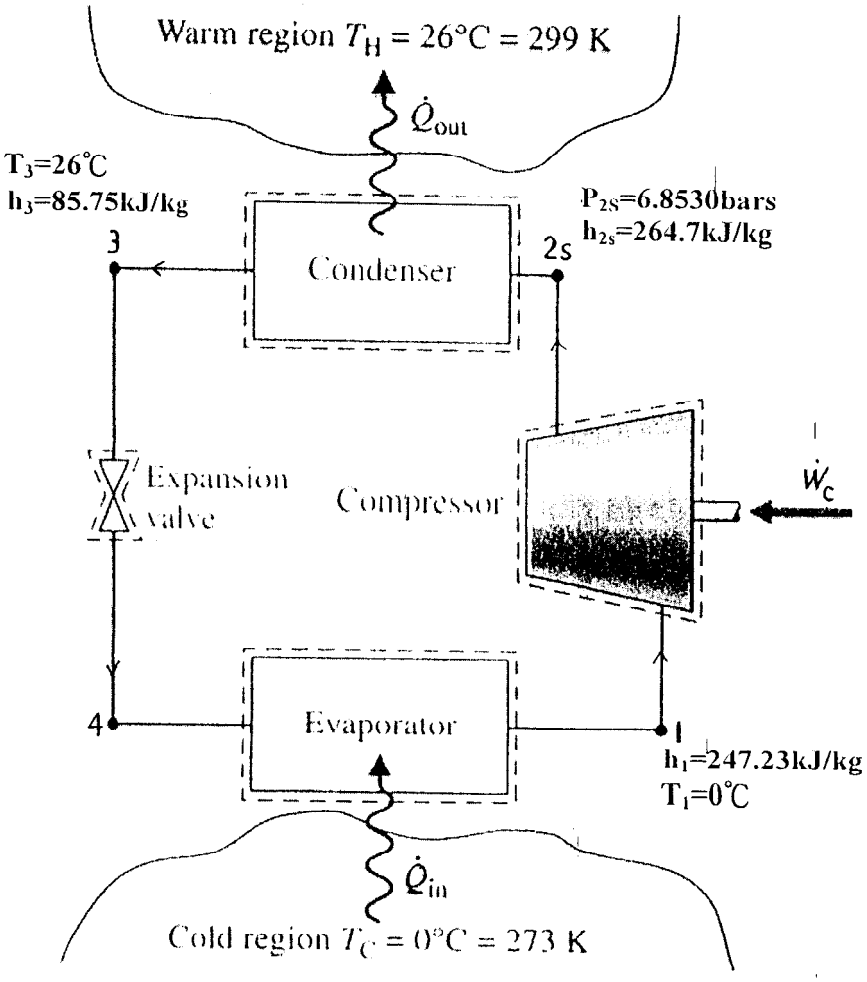
6. Refrigerant 134a is the working fluid in an ideal vapor-compression refrigeration cycle (the properties are shown in the figure) that communicates thermally with a cold region at 0℃ and a warm region at 26℃. Saturated vapor enters the compressor at 0℃ and saturated liquid leaves the condenser at 26℃. The mass flow rate of the refrigerant is 0.08 kg/s.
Determine：
(1) the compressor power, in kW,
(2) the refrigeration capacity, in tons,
(3) the coefficient of performance, and
(4) the coefficient of performance of a Carnot refrigeration cycle operating between warm and cold regions at 26 and 0℃, respectively.



(20%)