淡江大學 97 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

A

准帶項目請打「V」	
V	簡單型計算機

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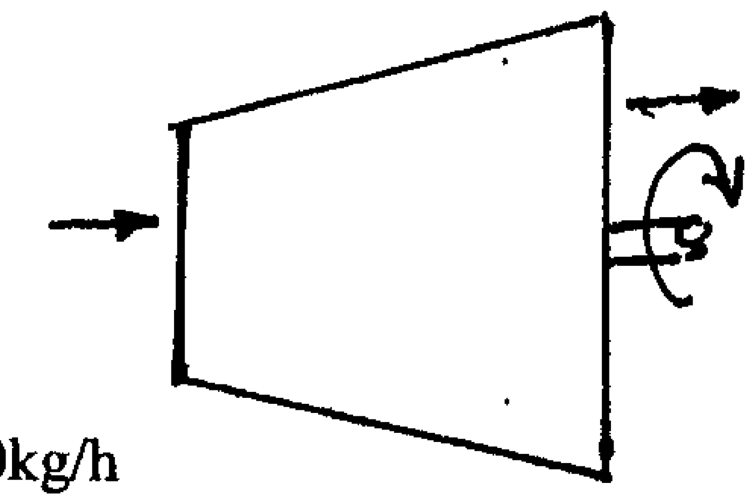
1. For a system undergoing a thermodynamic cycle consisting of four processes in series. The kinetic and potential energy can be neglected.
Determin, (a) The missing table entries, each in kJ.
(b)whether the cycle is a power or a refrigeration cycle?

Process	U(kJ)	Q(kJ)	W(kJ)
1-2	600	?	-600
2-3	?	?	-1300
3-4	-700	0	?
4-1	?	500	700

20%
2. Steam enters a turbine at steady state with a mass flow rate of 4500 kg/h. The turbine develop a power output of 1000kW. The inlet and outlet conditions are shown in the following figure. Calculate the heat transfer between the turbine and sourroundings. in kW. (potential energy change was neglected)

The inlet conditions:

p_1=60 bar
T_1=400 C
Velocity V_1=10m/s
h_1=3177.2kJ/kg
mass flow rate=4500kg/h



The oulet conditions:

p_2=0.1bar
h_2= 2345.4 kJ/kg
V_2= 50 m/s
Work rate 1000kW

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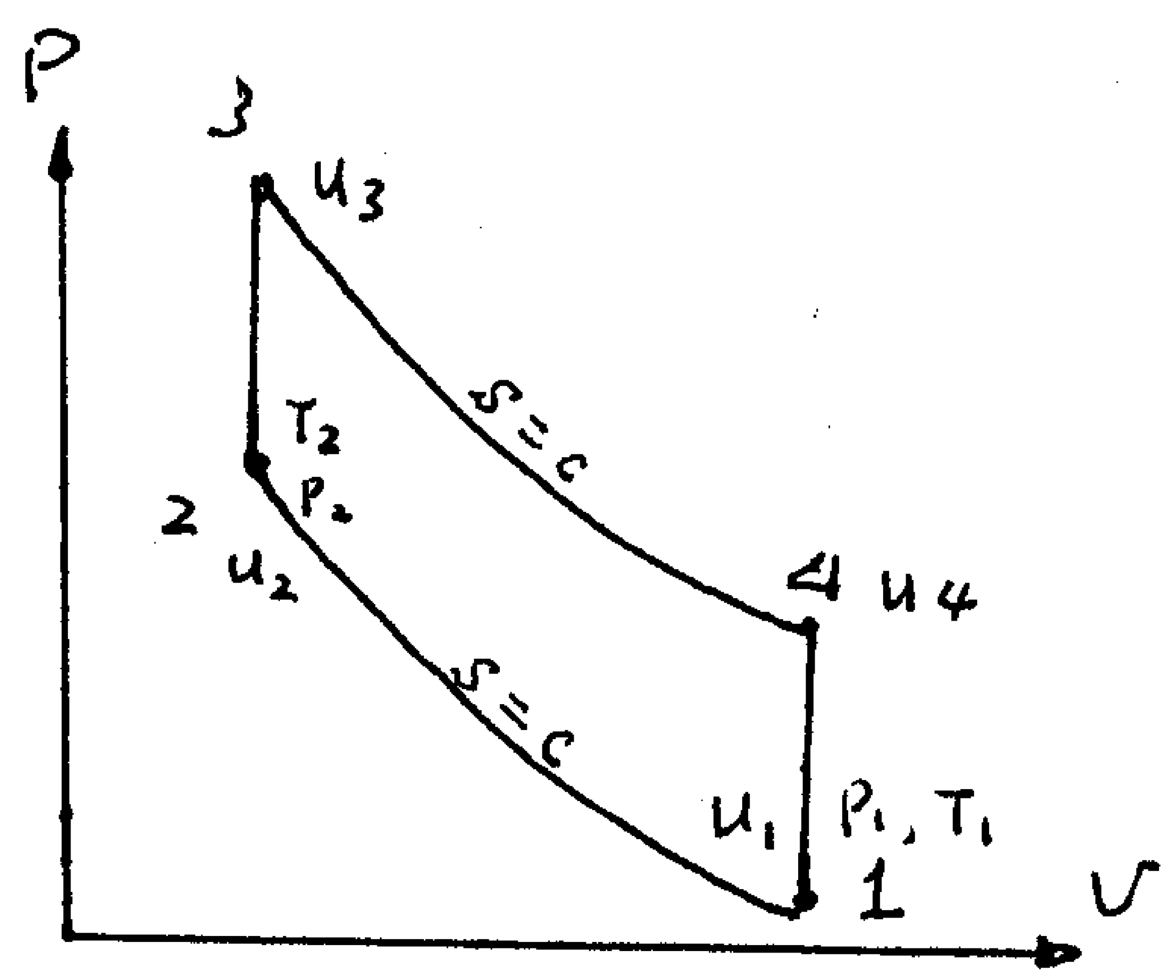
3. For an air-standard OTTO cycle , the specific internal energy u and temperature T at each state are given. The compression ratio r is also given, with isentropic compression stroke start from state 1 to state 2.
(a) determine thermal efficiency as function of u
(b) Show that $\eta = 1 - \frac{T_1}{T_2}$
(c) Show that $\eta = 1 - \frac{1}{r^{k-1}}$,where $k = c_p / c_v$



◀注意背面尚有試題▶

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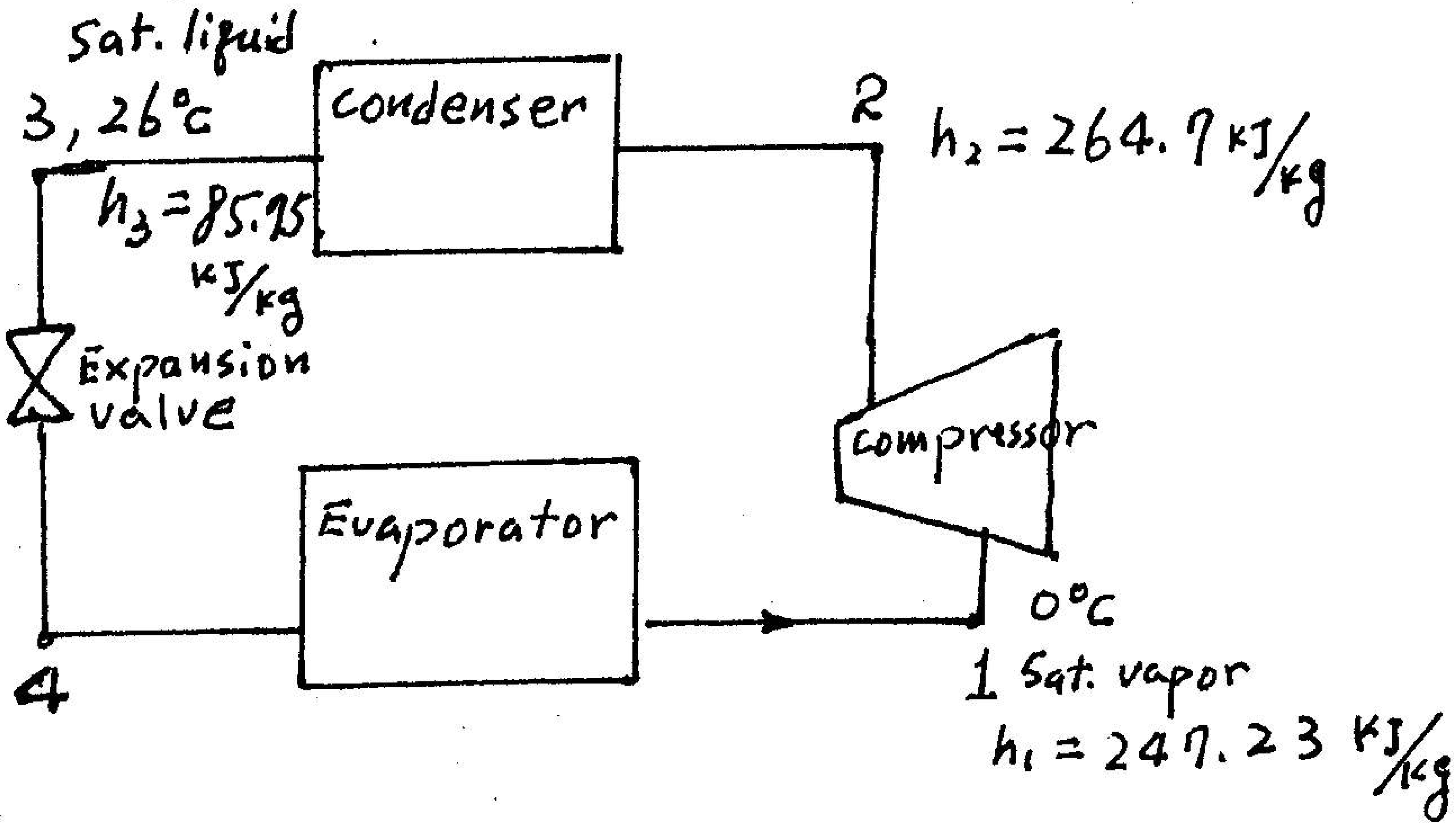
4. Refrigerant 134a is the working fluid in an ideal vapor compression cycle. The inlet temperature of the saturated vapor into compressor is 0 degree C, and the outlet temperature of condenser is 26 degree C with saturated liquid, the mass flow rate of refrigerant is 0.1 kg/s. Determine (a) the ~~referation~~ refrigeration capacity and (b) the coefficient of performance.



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5. From Tds equations　$Tds = du + Pdv$,　$Tds = dh - vdP$,
Show that
(a) let $u = f(s,v)$, then, $\left(\frac{\partial T}{\partial v}\right)_s = -\left(\frac{\partial P}{\partial s}\right)_v$
(b) let $h = f(s,P)$, then, $\left(\frac{\partial T}{\partial P}\right)_s = \left(\frac{\partial v}{\partial s}\right)_P$