淡江大學九十二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

准帶項目請打「○」否則打「×」
○ 簡單型計算機

1. Explain the following thermodynamic terms:
   (a) specific volume.
   (b) coefficient of performance of refrigeration cycle.
   (c) polytropic process.
   (d) Clapeyron equation.
   (e) exergy.

(15%)

2. Try to explain the first law and the second law of thermodynamics by using
   (a)closed system.
   (b) control volume (open) system.

(15%)

3. What are the relationships between thermal efficiency and compression ratio of the cold air-standard Otto and Diesel cycles ?
   With the same compression ratio, which one has larger thermal efficiency?

(15%)

4. Draw a schematic diagram of a forced-convection, counter-flow cooling tower.
   How does the cooling tower provide the cool water?

(15%)

◀注意背面尚有試題▶

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5. An insulated plane wall of a house has an average thermal conductivity of $1.5\frac{W}{m \cdot K}$. The thickness of the wall is 6m. At steady state, the rate of energy transfer by conduction through an area of $160m^2$ is 400W, and the temperature decreases linearly from the inner surface to the outer surface. If the outside surface temperature of the wall is 20℃, what is the inner surface temperature, in ℃?

(20%)

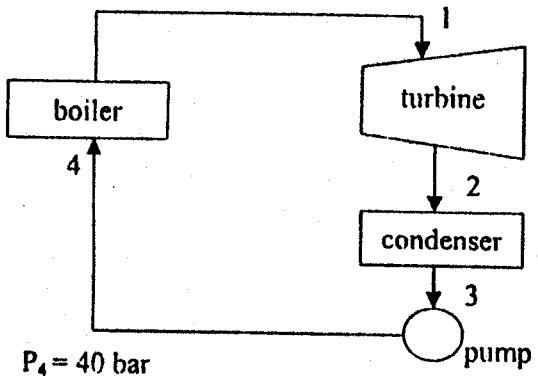
6. Water is the working fluid in an ideal Rankine cycle as show. The net power output of the cycle is 100MW. Determine for the cycle

(a) the mass flow rate of water, in $\frac{kg}{sec}$.

(b) the rate of heat transfer to the working fluid passing through the boiler, in kW.

(c) the rate of heat transfer to the working fluid passing through the condenser, in kW.

(d) the thermal efficiency.



$P_1 = 40$ bar
$T_1 = 480$ ℃
$h_1 = 3399.2$ kJ / kg

$P_2 = 0.08$ bar
$h_2 = 2199.1$ kJ / kg

$P_3 = 0.08$ bar
$h_3 = 173.88$ kJ / kg

$P_4 = 40$ bar
$h_4 = 177.91$ kJ / kg

(20%)