淡江大學 95 學年度碩士班招生考試試題

63

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. Write out the meaning of the following terms : (15%)
   (a) Thermodynamic system
   (b) surroundings
   (c) boundary
   (d) intensive property
   (e) extensive property

2. Try to explain the following thermodynamic terms : (15%)
   (a) Kelvin-Planck statement of the second law
   (b) irreversibilities
   (c) Kelvin temperature scale
   (d) Carnot two corollaries of the second law of a power cycle
   (e) increase of entropy principle

3. What are the isentropic efficiencies of turbine, nozzle and compressor? (15%)

4. Answer the following true or false. If false, explain why. (15%)
   (a) A process that violates the second law of thermodynamics violates the first law of thermodynamics.

   (b) When a net amount of work is done by a closed system undergoing an internally reversible process, a net heat transfer of energy to the system also occurs.

   (c) One corollary of the second law of thermodynamics states that the change in entropy of a closed system must be greater than zero or equal to zero.

   (d) A closed system can experience an increase in entropy only when there is energy transfer by heat to the system during the process.

   (e) Entropy is produced in every internally reversible process of a closed system.

◀注意背面尚有試題▶

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63-2

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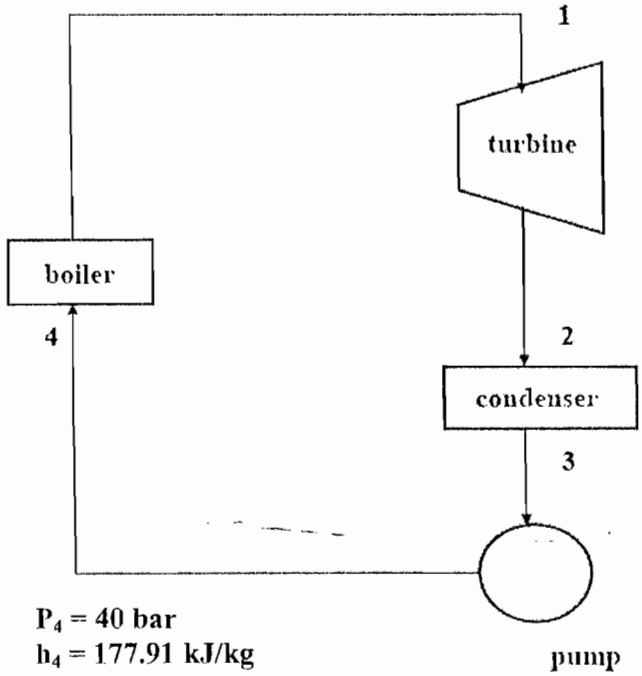
✓	簡單型計算機

5. An inventor claims to have developed a power cycle capable of delivering a net work output of 410 kJ for an energy input by heat transfer of 1000 kJ. The system undergoing the cycle receives the heat transfer from hot gases at a temperature of 500 K and discharges energy by heat transfer to the atmosphere at 300 K. Is it possible? (20%)

6. What is the working fluid in an ideal Rankine cycle as show. The net power output of the cycle is 100 MW. Determine for the cycle (20%)
   (a) the mass flow rate of water, in 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
$T_1 = 4801\ ^\circ C$
$h_1 = 3399.2$ 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