

淡江大學八十九學年度日間部轉學生招生考試試題

6145

系別：機械工程學系三年級

科目：熱力學

本試題共 2 頁

本試題雙面印製

1. Explain the following thermodynamic terms:

- (1) internal energy
- (2) critical point
- (3) specific volume
- (4) specific heat
- (5) enthalpy
- (6) entropy
- (7) irreversibility
- (8) dew point
- (9) wet bulb temperature
- (10) dry bulb temperature

(20%)

2. Write out and explain the following thermodynamic equations :

- (1) ideal gas equation of state
- (2) van der Waals equation of state
- (3) inequality of Clausius
- (4) Bernoulli equation
- (5) Clapeyron equation

(20%)

3. Try to explain the following thermodynamic processes:

- (1) throttling process
- (2) isothermal process
- (3) adiabatic process
- (4) isentropic process
- (5) polytropic process

(15%)

4. Draw a schematic of a cogeneration system (汽電共生系統) in which process steam is bled from the turbine and explain this cogeneration system.

(15%)

◀ 注意背面尚有試題 ▶

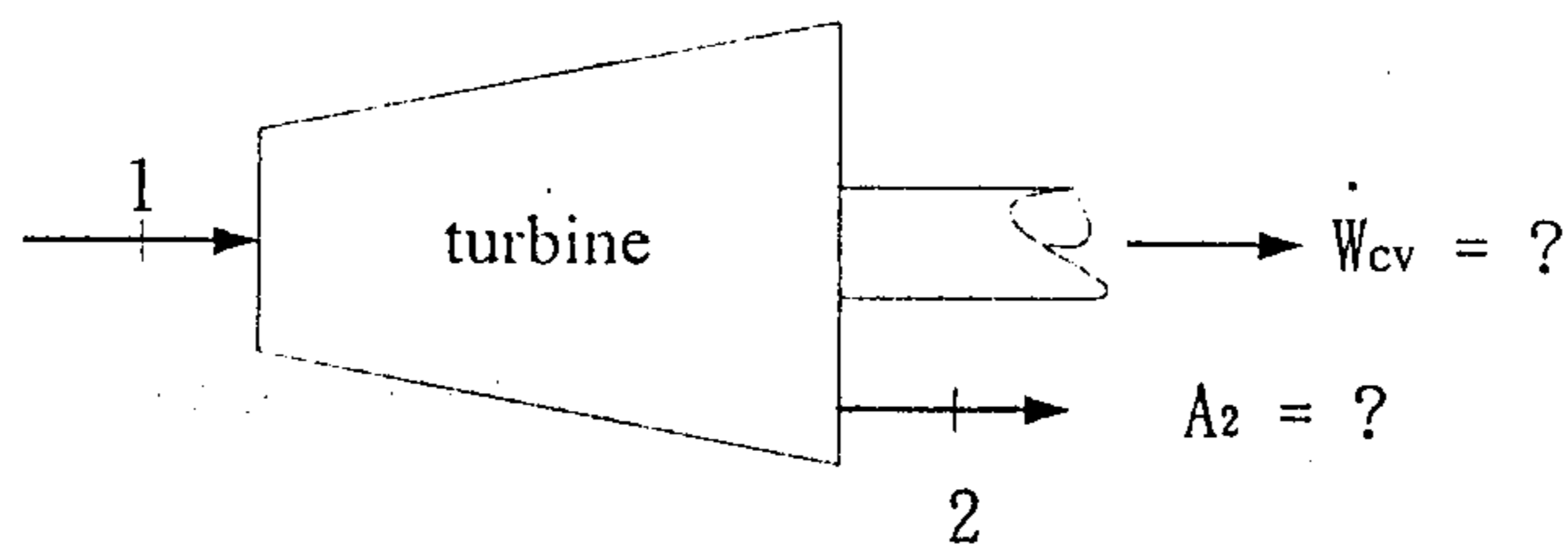
淡江大學八十九學年度日間部轉學生招生考試試題

系別：機械工程學系三年級

科目：熱力學

本試題共 2 頁

5. Air expands through a turbine from $p_1 = 5$ bars, $T_1 = 900$ K and $h_1 = 932.93$ kJ/kg to $p_2 = 1$ bar, $T_2 = 600$ K, $h_2 = 607.02$ kJ/kg. The mass flow rate of air is 10 kg/s. The inlet velocity is small compared to the exit velocity of 100 m/s. The turbine operates at steady state. Heat transfer between the turbine and its surroundings and potential energy effects are negligible. Calculate the power output of the turbine, in kW and the exit area, in m^2 . (The molecular weight of air is 28.97. $\bar{R} = 8.314$ kJ/kmol.k)



(15%)

6. Consider the simple steam power plant as shown. Determine the following quantities per kilogram flowing through the unit.

(a) Turbine work

(b) Heat transfer in condenser

State 1:

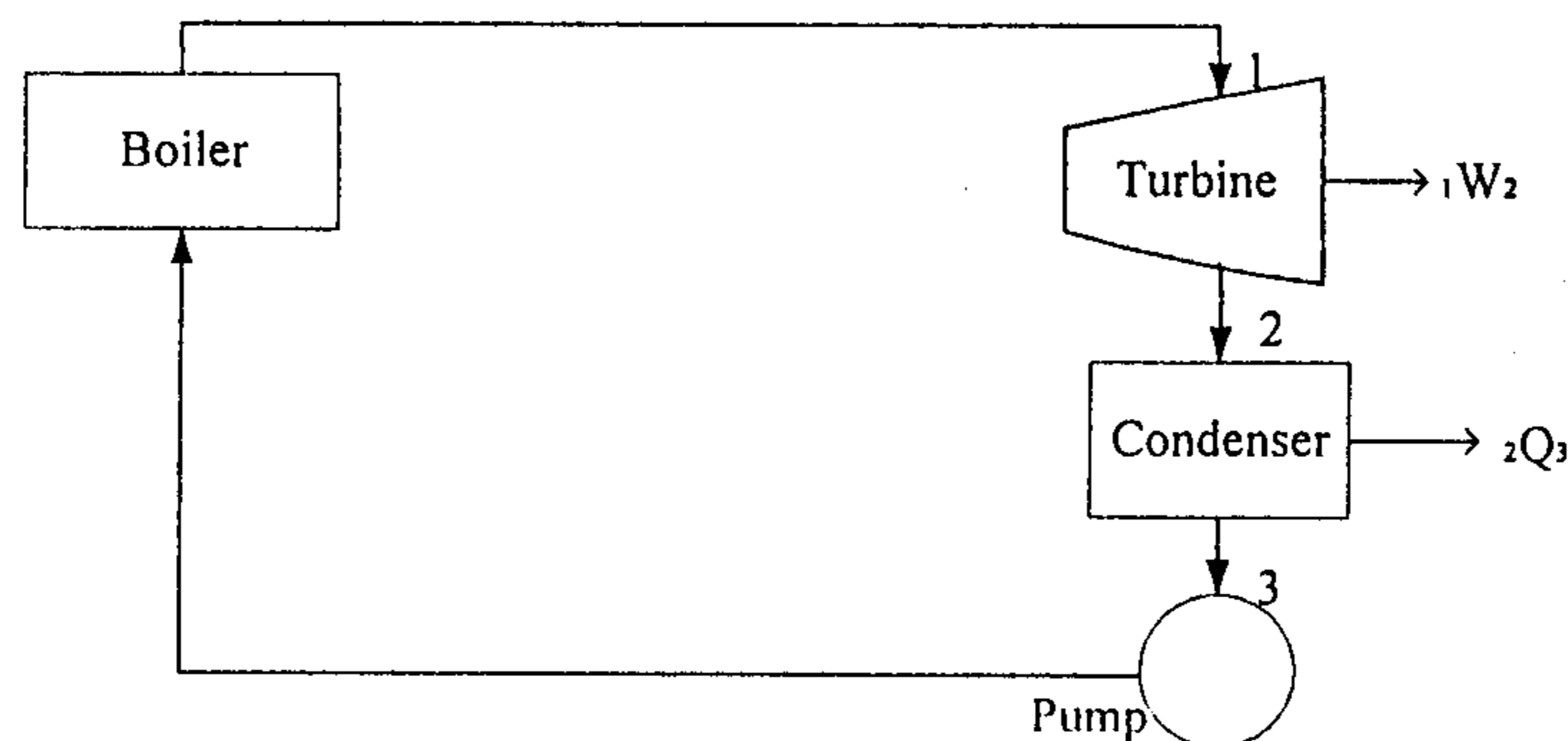
$$P = 1.9 \text{ MPa}, \quad T = 290 \text{ }^\circ\text{C}, \quad h = 3002.5 \text{ kJ/kg.}$$

State 2:

$$P = 15 \text{ kPa}, \quad h = 2361.8 \text{ kJ/kg.}$$

State 3:

$$P = 14 \text{ kPa}, \quad T = 45 \text{ }^\circ\text{C}, \quad h = 188.5 \text{ kJ/kg.}$$



(15%)