

65-1

淡江大學 96 學年度碩士班招生考試試題

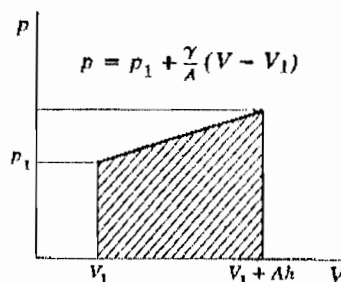
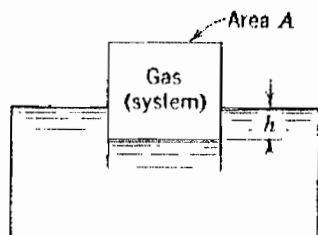
系別：機械與機電工程學系

科目：熱 力 學

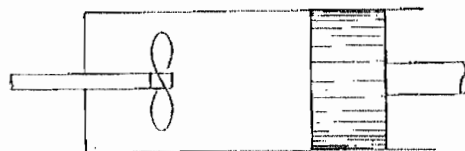
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✓	簡單型計算機

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1. The cylinder shown in the figure is closed at its upper end and has a cross-sectional area of  $A \text{ ft}^2$ . Initially it contains  $V_1 \text{ ft}^3$  of a gas at atmospheric pressure. The outer vessel, which contains a liquid with a free surface exposed to the atmosphere, is filled to the point of overflowing. How much work must be done on or by the gas if it expands until the liquid level in the cylinder is  $h \text{ ft}$  lower than that in the surrounding vessel? (20%)



2. Consider as a system the fluid contained in the cylinder as shown in the figure. The fluid expands from a volume of  $1.4$  to  $1.6 \text{ ft}^3$  while the pressure remains constant at  $100 \text{ psia}$  and while the paddle wheel does  $3600 \text{ ft-lb}$  of work on the system. Then,
- How much work is done by the system on the piston? (10%)
  - What is the net amount of work done or by the system? (10%)



3. Work in the amount of  $15560 \text{ ft-lb}$  is required to compress  $2 \text{ lb}$  of a certain ideal gas ( $C_V=0.18 \text{ b/lb-F}$  throughout the temperature range involved) in a closed system from an initial pressure of  $14.1 \text{ psia}$  to a final pressure  $P$ . The temperature increases by  $50 \text{ F}$  during the compression. Compute the heat transfer. (20%)

本試題雙面印製

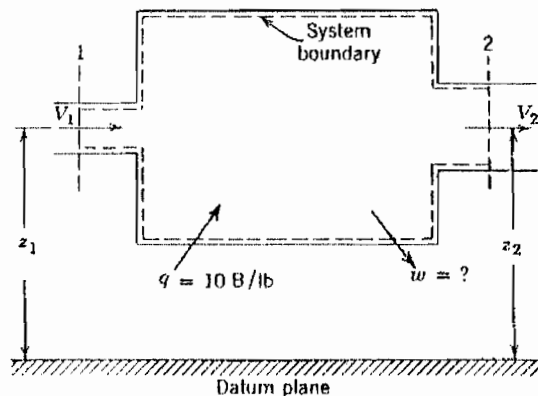
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4. In a steady-flow process, the pressure of a fluid decreased between the entrance and exit of a machine from 200 to 40 psia, the specific volume increased from 3 to 10 ft<sup>3</sup>/lb, the internal energy decreased by 40 B/lb, and 10 B/lb of heat was added to the fluid between entrance and exit. Entrance and exit pipes were at the same elevation, and entrance and exit velocities were 10 and 15 ft/s, respectively. Determine the amount of work done on or by the fluid. (20%)



5. Air at 14.7 psia, 70 F ( $\rho=0.0749$  lb/ft<sup>3</sup>), is taken into a gas-turbine power plant at a velocity of 400 ft/s through an opening of 1.2 ft<sup>2</sup> cross-sectional area. The air is compressed, heated, expanded through a turbine, and exhausted at 26 psia, 300 F ( $\rho=0.0924$  lb/ft<sup>3</sup>), through an opening of 1.0 ft<sup>2</sup> cross-sectional area. The power output is 500 hp. The internal energy and enthalpy of the air in B/lb are given by the expression  $u=0.171 T$  and  $h=0.24 T$ , where T is absolute temperature, degree Rankine. Calculate the net amount of heat added to the air in B/lb. (20%)

