淡江大學96學年度轉學生招生考試試題

系別：機械與機電工程學系三年級　　科目：熱　力　學

可否使用計算機			
可	V	否	

本試題共 / 頁

1. Air is contained in a vertical cylinder fitted with a frictionless piston and a set of stops, as shown in Fig.1. The piston cross-sectional area is 0.2 m^2, and the air inside is initially at 200 kPa, 500 ℃. The air is then cooled as a result of heat transfer to the surroundings.

   a) What is the temperature of the air inside the cylinder when the piston reaches the stops? (15%)

   b) The cooling is now continued until the temperature reaches 20 ℃. What is the pressure at this state? (15%)

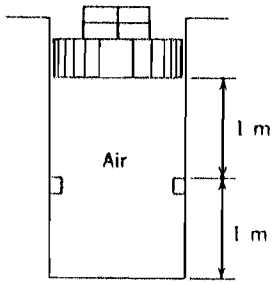

Fig.1

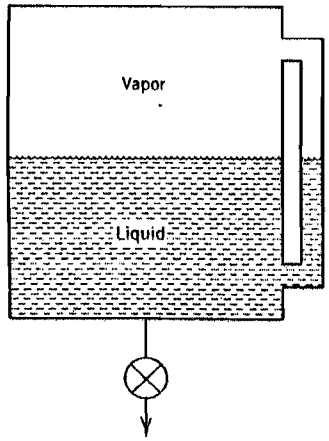

Fig.2

2. A rigid tank fitted with a sight glass, as shown in Fig.2, contains Freon-12 at 25 ℃. Liquid is slowly withdrawn from the bottom, during which the temperature inside remains constant. If the cross-sectional area of the tank is 0.05 m^2 and the liquid level drops 150 mm, determine the mass of Freon-12 withdrawn during the process. (25%)

3. A water storage tank contains liquid and vapor in equilibrium at 250 ℃. The distance from the bottom of the tank to the liquid level is 10 m. What is the difference in pressure reading between the top of the tank and the bottom of the tank? (20%)

4. A container of liquid methane at 500 kPa pressure has a cross-sectional area of 0.5 m2, as shown in Fig.3. As a result, of heat transfer to the liquid methane, some of the liquid evaporates and in one hour the liquid level in the tank drops 30 mm. The vapor that leaves the container passes through a heater and then exits at 500 kPa, 275 K. Calculate the volume rate of flow of methane gas exiting the heater. (25%)

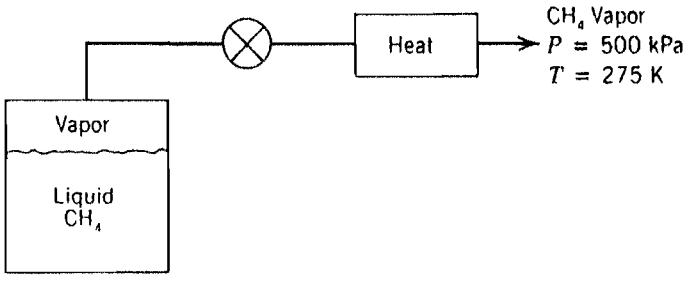

Fig.3