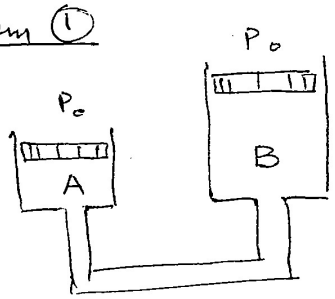
TEST ONE MONDAY July 18, 2005 MEN210 W. ASSAF

Problem (1)



$g = 9.81$ m/sec^2

outside pressure $P_o = 100$ kPa

gas is contained in cylinders A & B

cross sectional area:

$A_A = 75$ cm^2 $A_B = 25$ cm^2

mass of pistons:

$m_A = 25$ kg $m_B = ?$

Find the mass m_B so that non of the pistons have to rest on the bottom.

Ref. 2.73/38

Problem (2)

Ammonia in a piston/cylinder arrangement is at 700 kPa & 80°C. It is now cooled at constant Pressure to saturated vapor (state 2) at which point the piston is locked with a pin. Cooling continues to -10°C (state 3). Show the process from 1 to 2 & 2 to 3 on a PV & TV diagram & label correctly.

Ref. 3.108/78

Problem (3)

A piston/cylinder has 1.5 kg of air treated as ideal gas at 300 K & 150 kPa. It is now heated up in a two step process. First constant volume to 1022 K (state 2) then followed by constant pressure process to 1500 K (state 3). Find the final volume & work in the process.

Ref. 4.62/109

Problem (4)

10 kg of H_2O in a piston/cylinder arrangement exist @ 100 kPa & 50% quality. The system is now heated so that the volume triples. The mass of the piston is such that a cylinder pressure of 200 kPa will float it. Find the final temperature & heat transfer in the process.

Figure P. 4.68/110

Reference. 5.61/150