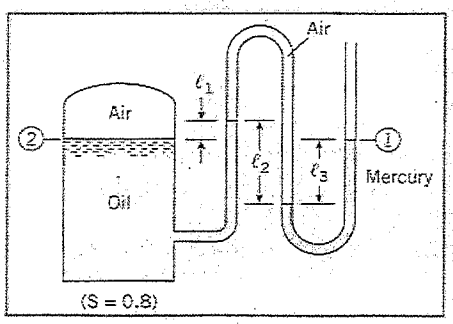
# 國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：流體力學【海工系碩士班甲組選考】

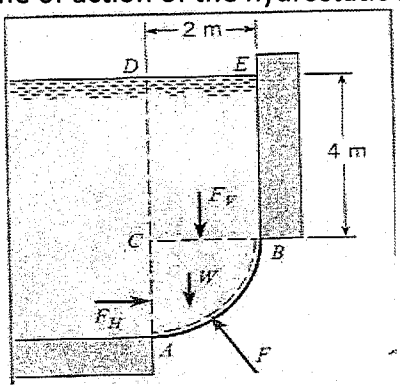
題號：4171



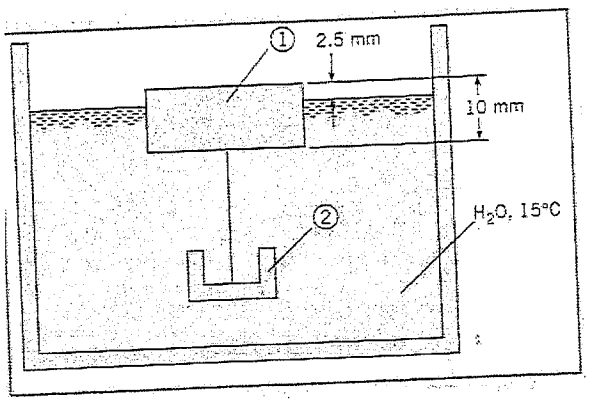
1. (24%) Explain the following terms:
   (1) Vapor pressure (2) center of pressure (3) system (4) boundary layer
   (5) no-slip condition (6) free stream (7) energy equation (8) minor loss
2. (16%) What is the pressure of the air in the tank if $l_1 = 40$ cm, $l_2 = 100$ cm and $l_3 = 80$ cm? Mercury specific gravity 13.6.




3. (15%) Surface AB is a circular arc with a radius of 2m and a width of 1m into the paper. The distance EB is 4 m. The fluid above surface AB is water, and atmospheric pressure prevails on the free surface of the water and on the bottom side of surface AB. Find the magnitude and line of action of the hydrostatic force acting on surface AB.

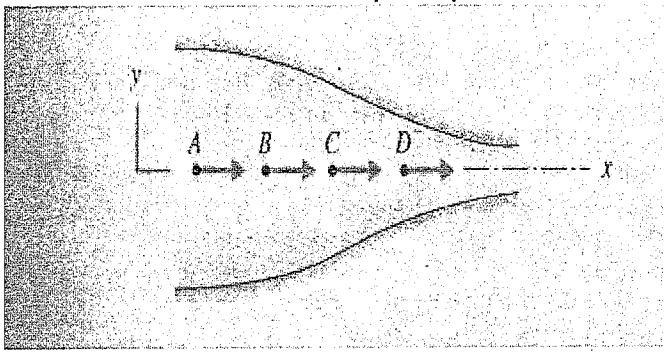



4. (15%) A metal part(object 2) is hanging by a thin cable from a floating wood block (object 1). The wood block has specific gravity $S_1$ =0.3 and dimensions of $50 \times 50 \times 10$ $mm$ .The metal part has a volume of $6600$ $mm^3$ .Find the mass $m_2$ of the metal part and the tension $T$ in the cable. Assume the water density is 1000 Kg/m$^3$.




5. (15%) The x-component of velocity at points A,B,C, and D, which are 10mm apart, is

measured to be 5.76,6.72,7.61,and 8.47m/s, respectively, in the plane steady, symmetrical, incompressible flow shown in Figure in which w=0. Estimate the x-component acceleration at C and the y-component of velocity 6mm above B.




6. (15%) A water jet is defected $60^{\circ}$ by a stationary vane as shown in the figure. The incoming jet has a speed of $30\,m/s$ and a diameter of 3cm.Find the force exerted by the jet on the vane. Neglect the influence of gravity.