國立交通大學八十八學年度碩士班入學考試試題

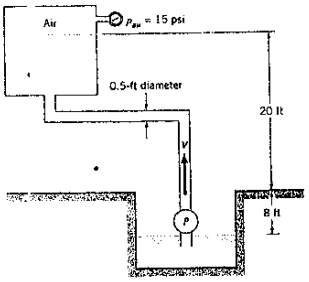
162 流體力學（土木工程學系 丙組）

科目：171 流體力學（土木工程學系 丙組在職）

＊作答前，請先核對試題、答案卷（試卷）與准考證上之所組別與考試科目是否相符!!

1. The drag on an airplane cruising at 240 mph in standard air (pressure = 1 atm) is to be determined from tests on a 1:10 scale model placed in pressurized wind tunnel. To minimize compressibility effects, the air speed in the wind tunnel is also to be 240 mph. Determine the required air pressure in the tunnel (assuming the same temperature for model and prototype, idea gas can be applied ($p=\rho RT$) and the increasing of air pressure will not change the viscosity) (20%)

2. A very viscous fluid with a density equal to water is pumped from a well to a pressurized holding tank as shown in Figure 2. The head supplied by the pump (h_p) is 89.8/V and the headloss is known to be given by $h_L = 100\ V$, where h_p and h_L are in feet, the average velocity of the fluid in the pipe, is in ft/s. Determine the flowrate. (20%)



(Figure 2)

3. 簡答題

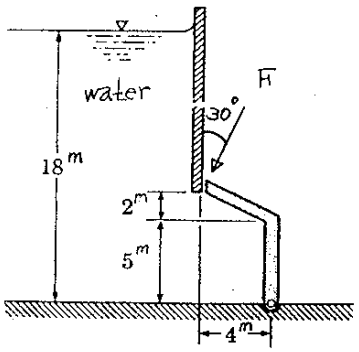
(a)何謂水躍 (Hydraulic Jump) (5%)

(b)溫度變化對液體及氣體的黏滯性有何影響，爲什麼? (5%)

(c)何謂 Drag force 及 Lift force . (5%)

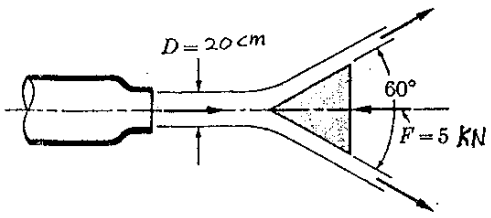
(d)Hydrauli . Grade Line 與 Energy Line 之差異爲何? (5%)

4. Determine the force per meter of length of the gate shown in (Figure 4) which must be applied to hold the gate closed . (The specific weight of water is 9800N) (20%)



(Figure 4)

5. A horizontal circular jet of water (Figure 5) (density = 1000kg/m^3) 20 cm in diameter strikes a conical deflector whose included angle at the vertex is 60^0 . A horizontal force 5KN is required to hold the deflector stationary in the jet . Determine the flow rate from the nozzle in cms . (20%)



(Figure 5)