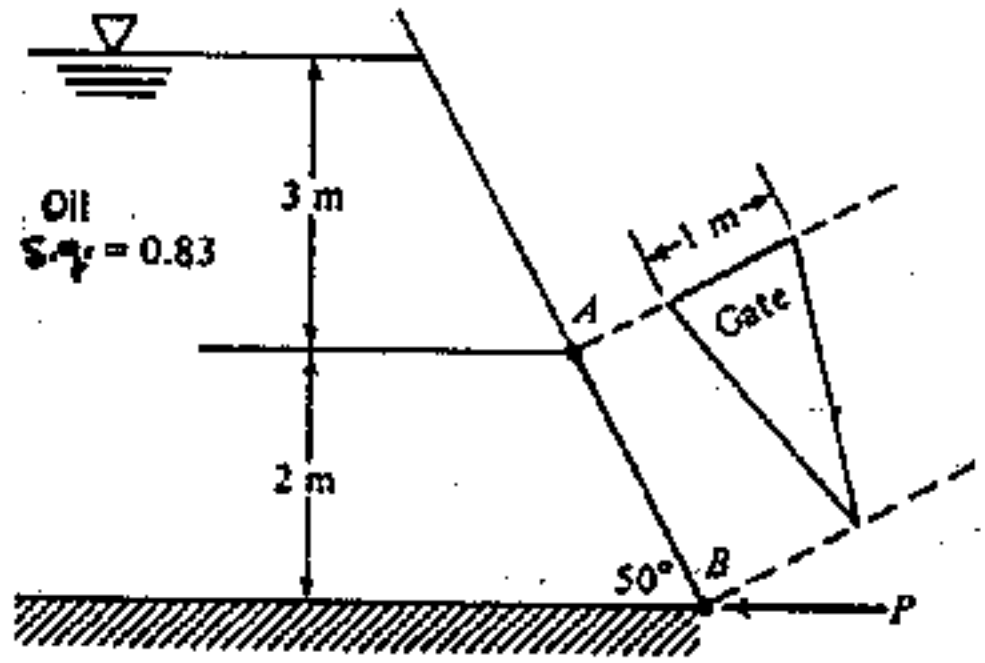
國立交通大學八十五學年度碩士班入學考試試題

152 兩組

科目：142流體力學（土木工程研究所乙組） 第 1 頁，共 2 頁

※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!! A2

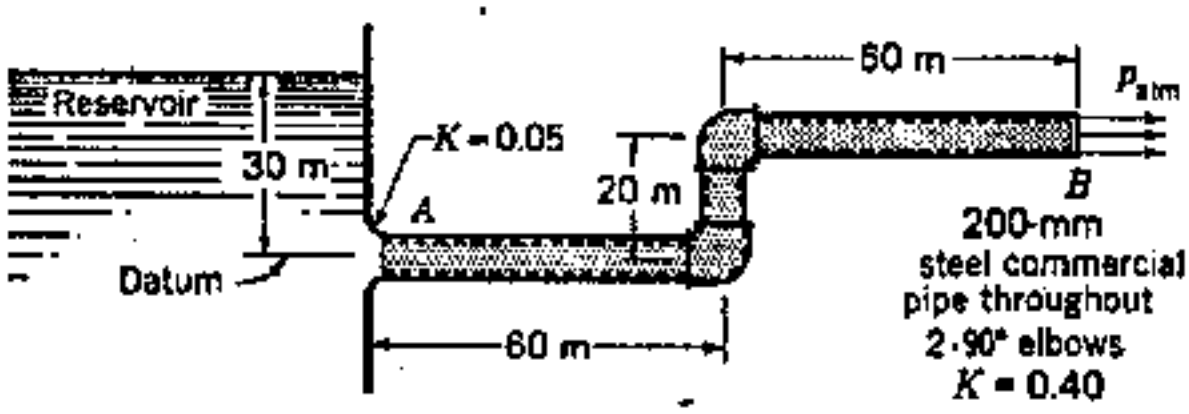
1.Isosceles traingular gate AB in following figure is hinged at A and taken to be weightless. What horizontal force P is required at point B for equilibrium?(20%)



2.The losses $\Delta p/l$ in turbulent flow through a smooth horizontal pipe depend upon velocity V, diameter D, dynamic viscosity μ,and density ρ. Use dimensional analysis to determine the general form of the equation

$$F(\frac{\Delta p}{l}, V, D, \rho, \mu) = 0 \qquad (20\%)$$

3.A pipe system carries water from a reservoir and discharges it as a free jet, as shown in figure. How much flow is to be expected through a 200-mm steel commercial pipe with the fittings shown?(20%)

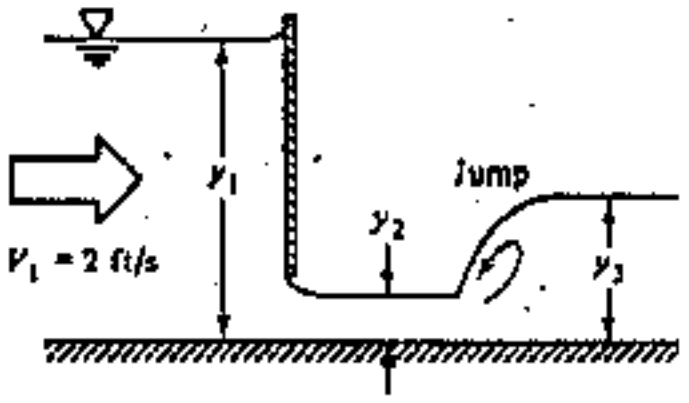


$\nu = .0113 \times 10^{-4}$ m²/s

$\rho = 999$ kg/m³

4. Using the velocity distribution $u/U = \sin(\pi y/2\delta)$, determine the equation for growth of the laminar boundary layer and for shear stress along a smooth flat plate in two-dimensional flow. Note that U is the velocity outside the boundary layer, δ is the thickness of the boundary layer, and u is the velocity at a distance of y from the flat plate. (20%)

5. Consider the flow under the sluice gate of the attached figure. If $y_1 = 10$ ft and all losses are neglected except the dissipation in the jump, calculate
   (1) y_2 and y_3, (8%)
   (2) the percentage dissipation, and (4%)
   (3) the force per unit width acting on the sluice gate. (8%)
   Note that the channel is horizontal and wide.



Appendix