淡江大學九十三學年度轉學生招生考試試題 51-1

系別：航空太空工程學系三年級　　科目：流 體 力 學

准帶項目請打「○」否則打「×」	
○	簡單型計算機

節次：7 月 14 日第 三 節

本試題共 1 頁

解釋名詞及簡答題：

(1) Fluid Statics 與 Fluid Dynamics 有何不同？ (6 分)

(2) 什麼是 Newtonian Fluid? 什麼是 Viscous flow? (8 分)

(3) 說明 Reynolds number 之物理意義。爲何 Reynolds number 大，流場傾向於 Turbulent Flow？Reynolds number 小，流場傾向於 Laminar Flow？(8 分)

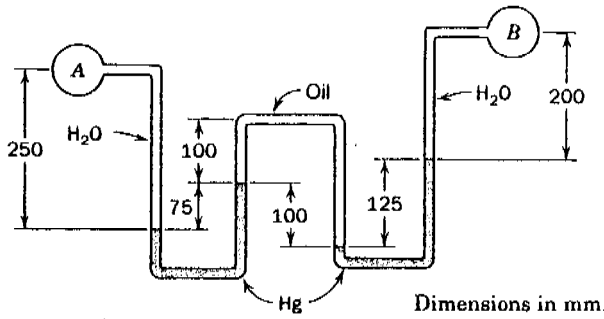
(4) 什麼是"boundary layer"? boundary layer 內速度分佈有何特性？(8 分)

(5) 在 pipe flow 之 entrance region 中，流體沿管道中心之速度是逐漸變大或變小？Why? (6 分)

(6) 在 fully developed pipe flow 中，你認爲 laminar 與 turbulent velocity profiles 有何不同(可用圖示表示之)？爲什麼？ (8 分)

計算題：

(7) Water (density:1000 kg/m^3) flows through pipes A and B. Oil, with specific gravity 0.8, is in the upper portion of the inverted U. Mercury (specific gravity 13.6) is in the bottom of the manometer bends. Determine the pressure difference, $P_A - P_B$, in units of kilopascals (kPa). (16 分)



(8) Which of the following sets of equations represent possible two-dimensional incompressible flow cases? (20 分)

(a) $u = x + y;\ v = x - y$
(b) $u = x + 2y;\ v = x^2 - y^2$
(c) $u = 4x + y;\ v = x - y^2$
(d) $u = xt + 2y;\ v = x^2 - yt^2$
(e) $u = xt^2;\ v = xyt + y^2$

(9) The drag force, F, on a smooth sphere depends on the relative velocity, V, the sphere diameter, D, the fluid density, ρ, and the fluid viscosity, μ, Obtain a set of dimensionless groups that can be used to correlate the experimental data. (Note: dimensional analysis) (20 分)