# 淡江大學八十七學年度日間部轉學生入學考試試題

系別：航太工程學系三年級　　科目：流體力學

本試題共 1 頁

一. 簡答或解釋下列各名詞：

32%

1. Eulerian Method of description ,
2. Streamline
3. Boundary layer
4. Reynolds number
5. Buckingham Pi theorem
6. Moody diagram
7. Major, minor head loss
8. Navier-Stokes equations

二.

16%

Which of the following sets of equations represent possible two-dimensional incompressible flow cases?

(a) $u = 2x^2 + y^2$; $v = x^3 - x(y^2 - 2y)$

(b) $u = 2xy - x^2 + y$; $v = 2xy - y^2 + x^2$

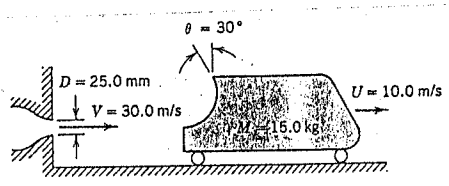
(c) $u = xt + 2y$; $v = xt^2 - yt$

(d) $u = (x + 2y)xt$; $v = (2x - y)yt$

三.

30%

A steady jet of water is used to propel a small cart along a horizontal track as shown. Total resistance to motion of the cart assembly is given by $F_D = kU^2$, where $k = 0.92$ N·s²/m². Evaluate the acceleration of the cart at the instant when its speed is $U = 10$ m/s.




四.

22%

The drag of a sonar transducer is to be predicted, based on wind tunnel test data. The prototype, a 300 mm diameter sphere, is to be towed at 5 knots (nautical miles per hour, and a nautical mile is 1852 meters) in seawater at 5°C. The model is 150 mm in diameter. Determine the required test speed in air. If the drag of the model at test conditions is 24.8 N, estimate the drag of the prototype.

seawater at 5°C, $\rho = 1025$ kg/m³ ; $\nu \cong 1.4 \times 10^{-6}$ m²/s

air at STP, $\rho = 1.23$ kg/m³ ; $\nu \cong 1.45 \times 10^{-5}$ m²/s