CIVE1400 Fluid Mechanics: Formula Sheet

You will be given this formula sheet in the exam.

This sheet should be used as an aid to memory - you should know how to use all these formulae.

$$\tau = \mu \frac{du}{dy}$$

$$\nu = \frac{\mu}{\rho}$$

$$p = \rho g h$$

$$R = \rho g \bar{z} A$$

R = pressure at centroid × area

$$S_c = \frac{\mathrm{I_{oo}}}{\mathrm{A\bar{x}}}$$

$$I_{oo} = I_{GG} + A\bar{x}^2$$

$$Q = Au = A_1 u_1 = A_2 u_2$$

$$\frac{p_1}{\rho g} + \frac{u_1^2}{2g} + z_1 = \frac{p_2}{\rho g} + \frac{u_2^2}{2g} + z_2 + h_f$$

$$u = \sqrt{2g(h_2 - h_1)}$$

$$u_1 = \sqrt{\frac{2gh(\rho_m - \rho)}{\rho}}$$

$$h_f = \frac{32 \mu L u}{\rho g d^2}$$

$$Q_{actual} = C_d A_1 A_2 \sqrt{\frac{2gh\left(\frac{\rho_{man}}{\rho} - 1\right)}{A_1^2 - A_2^2}}$$

$$Q = C_d A_o \sqrt{2gh}$$

$$Q_{\text{theoretical}} = \sqrt{2g} \int_0^H b h^{1/2} \, dh$$

$$Q_{actual} = C_d A_1 A_2 \sqrt{\frac{2g\left[\frac{p_1 - p_2}{\rho g} + z_1 - z_2\right]}{A_1^2 - A_2^2}}$$

$$Q = C_d \frac{2}{3} B \sqrt{2g} H^{3/2}$$

$$Q = C_d \frac{8}{15} \sqrt{2g} \tan\left(\frac{\theta}{2}\right) H^{5/2}$$

$$F_T = F_R + F_B + F_P$$

$$\mathrm{Re} = \frac{\rho u d}{\mu}$$

$$Q = \frac{\Delta p}{L} \frac{\pi d^4}{128 \mu}$$

$$F = Q \rho (u_2 - u_1)$$