

$$Q = \frac{0.00216}{0.0313} = 0.0713 \text{ m}^3/\text{s}$$

$$3) D_1 = 0.15 \text{ m}, D_2 = 0.3 \text{ m}$$

$$S.G. = 0.9, C_d = 0.64$$

$$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.15^2}{4} = 0.0176 \text{ m}^2$$

$$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.3^2}{4} = 0.07069 \text{ m}^2$$

$$L = 0.5 \left(\frac{13.6}{0.9} - 1 \right) = 7.03 \text{ m}$$

$$Q = \frac{C_d A_1 A_2}{\sqrt{A_1^2 + A_2^2}} \times \sqrt{2gh}$$

$$= \frac{0.64 \times 0.0176 \times 0.07069}{\sqrt{(0.0176)^2 + (0.07069)^2}} \times \sqrt{2 \times 9.81 \times 7.03}$$

$$= \frac{0.000796 \times 11.7609}{\sqrt{0.000309 + 0.00499}}$$

$$= 2.03 \times 10^{-3} \text{ m}^3/\text{s}$$

$$4) \text{ Axis} = 13 \text{ m}$$

$$170 \text{ mm } (0.17 \text{ m})$$

$$S.G. = 13.6$$

$$S.G. \text{ of } \text{Sy water} = 1.026$$

$$L = 0.17 \left(\frac{13.6}{1.026} - 1 \right)$$

$$= 2.083 \text{ m}$$

$$V = \sqrt{2gh}$$

$$= \sqrt{2 \times 9.81 \times 2.083} = 6.39 \text{ m/s}$$

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COMPUTER ENGINEERING
ENG 214

1) $L = 20m$

V_1 (smaller end) = 5m/s

V_2 (lower end) = 2m/s

$k = 0.35 (V_1 - V_2)^2$

P_1 at smaller head 2.5m
$$\frac{P_2}{\omega} = \frac{P_1}{\omega} + \frac{(V_1^2 + V_2^2)}{2g} + (Z_1 - Z_2)L$$

$$= 2.5 + \frac{5^2 - 2^2}{2 \times 9.81} + 2 - \frac{(0.35(5^2))^2}{2 \times 9.81}$$

$$= 2.5 + 1.07 + 2 - 0.18055$$

Pressure at lower head

$$= 5.409 \text{ bar} \approx 5.41 \text{ bar}$$

2) Inlet diameter = 0.2m

Throat diameter = 0.1m

$C_d = 0.98$

$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.2^2}{4} = 0.0314 \text{ m}^2$

$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.1^2}{4} = 7.85 \times 10^{-3} \text{ m}^2$

$h = \frac{P_1}{\omega} - \frac{P_2}{\omega}$

$\frac{P_1}{\omega} = \frac{1.765 \times 10^{-2} \text{ N/m}}{9.81}$

$= 1.799 \times 10^{-3}$

$\frac{P_2}{\omega} = 0.3 \times 3.6 = 4.08$

$h = \frac{P_1}{\omega} - \frac{P_2}{\omega} = 1.799 \times 10^{-3} - (4.08) = 4.082 \text{ m}$

$$Q = \frac{0.98 \times 0.0314 \times 7.85 \times 10^{-3}}{\sqrt{(0.0314)^2 - (7.85 \times 10^{-3})^2}} \times \sqrt{2 \times 9.81 \times 4.082}$$

$$Q = 0.98 \frac{0.0002415 \times 89.49}{\sqrt{0.00092}}$$