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DEPT: CIVIL ENGINEERING

COURSE: FLUID MECHANICS; EN9014

### ASSIGNMENT.

(2) Inlet diameter,  $d_1 = 20\text{cm} = 0.2\text{m}$ .

Throat diameter,  $d_2 = 10\text{cm} = 0.1\text{m}$

$$z_1 = z_2$$

$$P_1 = 17.658 \text{ N/cm}^2 = \frac{17.658}{10^4} = 17.658 \times 10^{-4} \text{ N/m}^2$$

$$\frac{P_2}{\rho} = -0.03\text{m} \times 13.6$$
$$= -0.408\text{m}$$

Cd, co-efficient of discharge = 0.98

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

$$h = \frac{P_1}{\rho} - \frac{P_2}{\rho}, \quad \frac{P_1}{\rho} = \frac{17.658 \times 10^4}{9.81 \times 1000} = 18\text{m}$$

$$h = 18 - (-0.408)$$
$$= 18.408\text{m}$$

$$A_1 = \pi d_1^2 / 4 = \frac{\pi \times 0.2^2}{4} = \frac{\pi \times 0.04}{4} = 3.14 \times 10^{-2}$$

$$A_2 = \pi d_2^2 / 4 = \frac{\pi \times 0.1^2}{4} = \frac{\pi \times 0.01}{4} = 7.86 \times 10^{-5}$$

$$Q = 0.98 \times 3.14 \times 10^{-2} \times 7.86 \times 10^{-5} \times \sqrt{2 \times 9.81 \times 18.408}$$

$$= \frac{\sqrt{(3.14 \times 10^{-2})^2 - (7.86 \times 10^{-5})^2}}{4}$$

$$Q = \frac{2.420 \times 10^{-8} \times \sqrt{2 \times 9.81 \times 18.408}}{3.14 \times 10^{-2}}$$

$$= 1.51 \times 10^{-3} \text{ m}^3/\text{sec}$$

$$Q = 1.51 \times 10^{-3} \text{ m}^3/\text{sec}$$