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Course code : ENG 214 Course title : Fluid mechanics

NO 1 Assignment MAT NO: 19/ENG04/060

$Z_1 = 0$

$Z_2 = 2.0m$

$V_1 = 5m/s$

$V_2 = 2m/s$ The Pressure $h = \frac{P_1}{\omega} = 2.5m$ $\frac{P_2}{\omega} = ??$

$$hf = 0.35\frac{(V_1 - V_2)^2}{2g} = 0.35\frac{(V_1 - V_2)^2}{2g}$$

$$= 0.35\frac{(5-2)^2}{2\times 9.81} = \frac{0.35\times 9}{2\times 9.81} = 0.1606m$$

Applying Bernoulli equation

$$\frac{P_1}{\omega} + \frac{V_1^2}{2g} + Z_1 = \frac{P_2}{\omega} + \frac{V_2}{2g} + Z_2 + hf$$

$$\frac{P_2}{\omega} = \frac{P_1}{\omega} + \frac{V_1^2}{2g} + Z_1 - \frac{V_2^2}{2g} - Z_2 - hf$$

$$= 2.5 + \frac{5^2}{2\times 9.81} + 0 - \frac{2^2}{2\times 9.81} - 2 - 0.1606$$

$$= 2.5 + 1.274 + 0 - \frac{2^2}{2\times 9.81} = 2.5 + 1.274 - 0.204 - 0.1606 - 2$$

$$= 1.4094m$$

$$= 1.41m$$

NO2 $d_1 = 0.3$ $d_2 = 0.11$

$$A_1 = \frac{\pi d_1^2}{4} = 0.0314m^2$$

$$A_2 = \frac{\pi d_2^2}{4} = 0.0098m^2$$

$$P_1 = 17.658\times 10^4$$

$$= 176580N/m^2$$

$P_2 = 0.5$ of hg

$0.5 \times 13.6 = 4.08m$

No 2

$\frac{P_1}{w} = \frac{176580}{1000 \times 9.81} = 18m$

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$h = h_1 - h_2$

$h = 18 - (-4.08$

$h = 18 + 4.08$

$= 22.08$

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

$= \frac{0.98 \times 0.0314 \times 0.00785 \times \sqrt{2gh}}{(0.0314)^2 - (0.0098)^2}$

$= \frac{0.00503}{0.0304}$

~~$Q = 0.1654$~~ $Q = 0.1654\ m^3/s$

No 3

$d_0 = 15cm = 0.15m$

$d_1 = 30cm = 0.3m$

$A_0 = \frac{\pi d_0^2}{4} = \frac{\pi (0.15)^2}{4} = 0.01767m^2$

$A_1 = \frac{\pi d_1^2}{4} = \frac{\pi (0.30)^2}{4} = 0.070686m^2$

$y = 50cm = 0.5m$

$h = \frac{P}{10} = y\left(\frac{\text{S.G of mecury}}{\text{S.G of oil}} - 1\right)$

$= 0.5\left(\frac{13.6}{09} - 1\right)$ S.G of mecury $= 0.17m$

No 4

Difference of kg

$y = 170\,mm$

$= \frac{170}{1000}$

$y = 0.17m$

S.G of mecury = 13.6

S.G of Sea water = 1.026

$h = y\left(\frac{13.6}{1.026} - 1\right)$

$= 0.17\,(12.255)$

$= 2.08$

Velocity $= \sqrt{2g\Delta h}$

$= \sqrt{2gh}$

$= \sqrt{2 \times 9.81 \times 2.08}$

$V = 6.39\,m/s$

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