$V = \sqrt{2gh}$

$V = \sqrt{2 \times 9.81 \times 2.083}$

$V = 6.39 ms^{-1}$

5.) $0.05 m^3/min$

15 bar

1700 rpm

$10 cm^3$ Prev

15 Nm

.08)

0^{-3}

$53 \times 10^{-3})^2$

$\times 4.08018$

7

$A_1 = \pi d^2/4 = \dfrac{\pi \times (15/100)^2}{4}$

$A_1 = 0.0176 m$

$A_2 = \dfrac{\pi d^2}{4} = \dfrac{\pi \times (30/100)^2}{4}$

$A_2 = 0.0706 m$

$h = y\left[\dfrac{13.6}{0.9} - 1\right]$

$h = 0.5\left[\dfrac{13.6}{0.9} - 1\right]$

$= 7.05 m$ of Oil

$Q = Cd \cdot \dfrac{A_1 A_2}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh}$

$Q = 0.64 \times \dfrac{0.0176 \times 0.0706 \times \sqrt{2 \times 9.81 \times 7.05}}{\sqrt{(0.0706)^2 - (0.0176)^2}}$

$Q = \dfrac{9.35 \times 10^{-3}}{4.0112}$

$Q = 2.33 \times 10^{-3} \ m^3/s$

4) Axis = 15m

170mm of mecury (0.17m)

S.G of mecury = 13.6

S.G of sea-water = 1.026

V = ?

$h = y\left(\dfrac{Sh_1}{Sh_2} - 1\right)$

$h = 0.17\left(\dfrac{13.6}{1.026} - 1\right)$

$h = 2.083m$

$y = 30cm$ (0.3m of mecury)

Pressure at inlet $P_1 = 17.658$

$= \frac{17658}{10000} = 1.7658 \times 10^{-3}\ N/m$

$\frac{P_1}{w} = \frac{17658 \times 10^{-3}}{9.81} = 1.8 \times 10^{-4}\ m$

$\frac{P_2}{w} = 0.3 \times 13.6 = -4.08$ of H_2O

$h = \frac{P_1}{w} - \frac{P_2}{w} = 1.8 \times 10^{-4} (-4.08)$

$h = 4.08018m$

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

$Q = 0.98 \times \frac{0.0314 \times 7.853 \times 10^{-3}}{\sqrt{(0.0314)^2 - (7.853 \times 10^{-3})^2}}$

$\times \sqrt{2 \times 9.81 \times 4.08018}$

$Q = \frac{0.000241}{0.0304} \times 8.947$

$Q = 0.0709\ m^3/s$

3.) $D_1 = 15cm$

$D_2 = 30cm$

50cm of mecury (0.5m)

$Q = ?$

$S.G = 0.9$

$Cd = 0.64$

A_1

4.) Axi

ECHEREBOR EFE CHRISTIAN
18/ENG05/014
Mechatronics Engineering
Basic Fluid Mechanics (ENG

1) $V_1 = 5ms^{-1}$

$V_2 = 2ms^{-1}$

P_1 at smaller end = 2.5m

$$h_f = \frac{(0.35(V^1 - V^2))^2}{2g}$$

$L = 2.0m$

P_2 at lower end

$L = z_1 - z_2 = 2m$

$$\frac{P_1}{w} + \frac{V_1^2}{2g} + z_1 = \frac{P_2}{w} + \frac{V_2^2}{2g} + z_2 + h_f$$

$$\frac{P_2}{w} = \frac{P_1}{w} + \frac{1}{2g}(V_1^2 - V_2^2) + (z_1 - z_2) - h_f$$

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

$= 2.5 + 1.07 + 2 - 0.11055$

$P_2 = 5.409 bar$,

$\therefore$ Pressure at lower end is 5.409 bar,

2) Inlet diameter = 200m

Throat diameter = 100m

Pressure at inlet = 17.658 N/m

Vacuum pressure at throat = 30cm of mercury

$C_d = 0.98$

$$A_1 = \frac{\pi d^2}{4} = \frac{(20/100)^2 \times \pi}{4}$$

$A_1 = 0.0314 m$

$$A_2 = \frac{\pi d^2}{4} = \frac{(10/100)^2 \times \pi}{4}$$

$A_2 = 7.853 \times 10^{-3} m$