$\frac{P_1}{w} = \frac{1.7658 \times 10^{-3}}{9.81} = 1.8 \times 10^{-4} m$

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

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

$h = 4.08018 m$

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

$Q = 0.98 \times \frac{0.0314 \times 7.853 \times 10^{-3}}{\sqrt{(0.0314)^2 - (7.853 \times 10^{-3})^2}} \times \sqrt{2 \times 9.81 \times 4.08018}$

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

$Q = 0.0709 m^3/s$

3. $D_1 = 15cm$ $D_2 = 30cm$

500mm mercury $= 0.5m$ $Q = ?$

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

$A_1 = \frac{\pi d^2}{4} = \frac{(15/100)^2 \times 3.14}{4} = 0.0176 m^2$

$A_2 = \frac{\pi d^2}{4} = \frac{(30/100)^2 \times 3.14}{4} = 0.0706 m^2$

$h = x\left[\frac{13.6}{0.9} - 1\right]$

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

$= 7.05 m$ of oil

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

$Q = \frac{0.64 \times 0.0176 (0.0706)}{\sqrt{(0.0706)^2 - (0.070)^2}} \times \sqrt{2 \times 9.81 \times 7.05}$

$Q = 9.85 \times 10^{-3}$

40.112

4. Axis = 15m

170 mm of Mercury (0.17m)

SG of mercury = (13.6)

SG of Sea water = 1.026 $V = ?$

$h = x\left(\frac{S_h}{S} - 1\right)$

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

$h = 2.083m$

$V = \sqrt{2gh}$

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

$V = 6.39 ms^{-1}$

5. $0.65 m^3/min$ 1700 rpm 15Nm

15 bar $10 cm^3/rad$

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Fluid mechanics

1 $V_1 = 5ms^{-1}$ $V_2 = 2ms^{-1}$
PH 9 Smaller end = 2.5m
$h_f = \frac{(0.35(V^2 - V^2)^2)}{2g}$ $L = 2.0m$
Pat lower end =
$L = Z_1 - Z_2 = Z_4$
$\frac{P_1}{w} + \frac{V_1^2}{2g} + Z_1 = \frac{P_2}{w} + \frac{V_2^2}{2g} + Z_2 + h_f$
$\frac{P_2}{w} = \frac{P_1}{w} + \frac{1}{2g}(V_1^2 + V_2^2) + (Z_1 - Z_2)h_f$
$= \frac{2.5 + 5^2 - 2^2}{2 \times 9.81} + 2 - \frac{(0.35(5-2)^2}{2 \times 9.81}$
$= 2.5 + 1.07 + 2 - 0.16055$
$P_2 = 5.4094m$
Pressure below end: 5.4094m

2 inlet diameter = 200m
Infant diameter = 100m
$P_1 = 17.658M$
J: 300m of mecury $Cd = 0.98$
$A_1 = \frac{\pi d^2}{4} = \frac{(\frac{20}{100})^2 \times 3.142}{4} = 0.0314 m^2$
$A_2 = \frac{\pi d^2}{4} = \frac{(\frac{10}{100})^2 \times 3142^2}{4} = 7.853 \times 10^{-3} m$
J = 30cm (0.3m of mecury)
$P_1 = 17.658$
$= \frac{17.658}{1000} = 1.7658 \times 10^3 N/m$