1 $V_1 = 5ms^{-1}$ $V_2 = 2ms^{-1}$

PH 9 Smaller end = 2.5m

$h_f = \frac{0.35(V^1 - V^2)^2}{2g}$ $L = 2.0m$

Phat lower end =

$L = Z_1 - Z_2 = 2_4$

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

$\frac{P_2}{w} = \frac{P_1}{w} + \frac{1}{2g}(V_1^2 + V_2^2) + (Z_1 - Z_2)h_f$

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

$= 2.5 + 1.07 + 2 - 0.16055$

$P_2 = 5.4096 q//$

Pressure 96 lowe end: $5.4096 q$

2 Inlet diameter = 200m

Throat diameter = 100m

$P_1 = 17.658M$

J = 300m of Mecury $Cd = 0.98$

$A_1 = \frac{\pi d^2}{4} = \frac{(\frac{20}{100})^2 \times 3.142}{4} = 0.0314 m//$

$A_2 = \frac{\pi d^2}{4} = \frac{(\frac{10}{100})^2 \times 3142}{4} = 7.853 \times 10^{-3} m$

J = 30cm (0.3m of mecury)

$P_1 = 17.658$

$= \frac{17.658}{1000} = 1.7658 \times 10^3 N/m$

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

$\frac{P_2}{W} = 0.3 \times 18.6 = 4.08$ of H_2O

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

$h = 4.08018 m$

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

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

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

$Q = 0.0708 m^3/s$

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

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

$S.G = 0.9$ $\mu = 0.64$

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

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

$h = J[\frac{13.6}{0.9} - 1]$

$h = 0.5[\frac{13.6}{0.9} - 2]$

$= 7.05 m$ of 0.9

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

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

$Q = \frac{9.85 \times 10^{-3}}{0.112}$

4. $A \times S = 15m$

170 mm of Mercury $(0.17m)$

SG of mercury $= (13.6)$

SG of Sea Water $= 1.026$ $V = J$

$h = J[\frac{SH}{S} - 1]$

$h = 0.17[\frac{13.6}{1.026} - 2]$

$h = 2.083m$

$V = \sqrt{2gh}$

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

$V = 6.39 ms^{-1}$

5. $0.65 m^3/min$ 17 000 Pm 15 Nma

18 bar $106 m^3 P_{at}$