NWOSU SEAN-MICHAEL FLUID MECHANICS

18/ENG02/1064

Computer Engineering

Q1 $V_1 = 5 m/s$, $V_2 = 2 m/s$

End = 2.5m

$h_f = \frac{(0.35(V^1 - U^2)^2}{25}$ L = 2.0m

P_n at lower end:

$L = t_1 - t_2 = 2.5$

$P/w + V_1^2/2g + Z_1 = P_2/w + V_2^2/2g + Z_2 + h_f$

$P_2/w = P_1/w + 1/2g(V_1^2 + V_2^2) + (Z_1 - Z_2)$

$= 2.5 + 1.07 + 2.0.16055$

$P_2 = 5.409$ bar

Pressure at lower end 5.409 bar

Q2 Inlet diameter = 20cm

In rat diameter = 10cm

$P_1 = 17.658m$

3.30cm of mercury

Cd = 0.98

$A_1 = \pi d^2/4 = \frac{20/100 \times 3.14}{4}$

$= 0.0314m$

$A_2 = \pi d^2/4 = \frac{(10/100)^2 \times 3.14}{4}$

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

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

$P_1/w = \frac{1.7656 \times 10^{-3}}{1600} = 1.7658 \times 10^{-3}$

$P_2/w = 0.3 \times 13.6 = -4.089 H_2O$

$h = P_1/w - P_2/w = 1.8 \times 10^{-8}$

$h = 4.08018m$

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

$Q = \frac{0.98 \times 0.0314 \times 7.853 \times 10^{-3}}{\sqrt{(0.0314)^2 - (7.85.3 \times 10^{-3})}}$

$Q = \frac{0.000246}{0.0304} \times 8.947$

$Q = 0.0709 m^3/s$

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

500m of mercury = 0.5m

Q = ?, S.G = 0.9 $C_d = 0.64$

$A_1 = \frac{\pi d^2}{4} = \frac{(18/100)^2 \times 3.14}{4}$

$= 0.0176 m^4$

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

$= 0.0706 m$

$h = y[13.6/0.9^{-1}]$

$= 7.05m$

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

$Q = \frac{0.64 \times 0.0176, 0.070\sqrt{2 \times 9.81 \times 7.05}}{\sqrt{(0.0700)^2 - (0.070)^2}}$

$Q = \frac{9.35 \times 10^{-3}}{40}$

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

4 A x S = 15m
170mm of mecury (0.17m)
SG of mecury (63.6)
SG or SG water = 1.026 V=)

$n = y\left(S_{w}/S_{1} - 1\right)$
$n = 0.17\left(13.6/1.026^{-1}\right)$

$h = 2.083m$
$V = \sqrt{2gh}$
$V = \sqrt{2 \times 9.81 \times 20.83}$
$V = 6.39 ms^{-1}$

6 $0.05 m^3/min$
15 bar
1700 rpm
$10 \cdot Pm^2\ P \cdot V$
15 Nm