$d_1 = 0.3m$

$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.3^2}{4}$

$= 0.07068 m^2$

$d_2 = 0.2m$

$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.2^2}{4}$

$= 0.051415 m^2$

$cd = 0.96$

specific weight of gas

$= 19.62 \, N/m^2$

$\rho = \frac{mg}{v} = \rho g$

$= \frac{19.62}{9.81} = \frac{\rho \times 9.81}{9.81}$

so,

$\rho g = 19.62$

$\rho = 2 kg/m^2$

$Q_1 = A_1 v_1 \quad , Q_2 = A_2 v_2$

$Q_1 = Q_2$

$\therefore v = \frac{Q_1}{A_1}$

$v_1 = \frac{Q1}{0.0707}$

$v_2 = \frac{Q}{0.0314}$

for the manometer

$P_1 + \rho g g z = P_2 + \rho_g g (z_1 - R_p)$

$+ \rho_w g R_p$

$P_1 - P_2 = \rho_g g (z_2 - R_p) + \rho_w g h_p$

$- \rho_g g z$

$P_1 - P_2 = 19.62 (z_2 - z_1) + 587.423$

$- i$

For the venturimeter

$\frac{P_1}{\rho_1 g} + \frac{v_2^2}{2g} + z_1 = \frac{P_1}{\rho_1 g} + \frac{v_2^2}{2g} + z_1$

$P_1 - P_2 = 19.62 (z_2 - z_1) + 0.803 v^2$

$\& \cdot z_2 - z_1 = 0.06m$

equating equ ① and ②

$19.62 (z_2 - z_1) + 587.223 = 19.62$

$(z_2 - z_1) + 0.10316^2$

$0.803 d^2 = 587.423$

$v_2^2 = \frac{587.423}{0.803}$

$v_2^2 = 731.535$

8) Throat diameter = 0.676m (d_2)

vertical diameter = 0.152 (d_1)

Relative density = 0.8

throat being = 0.914m

cd = 0.91

Bernoulli's equation

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

$q = V_1 A_1$, $Q = V_2 A_2$

$$A_2 = \frac{\pi d^2}{4} = \pi \times 0.076$$

$= 4.62 \times 10^{-3} m^2$

$$A_1 = \frac{\pi d^2}{4} = \pi \times 0.0152^2$$

$= 0.0181 m^2$

1) Then $P_1 - P_2 = 5170$

$$\left(\frac{P_1}{\rho g} + z_1\right) - \left(\frac{P_2}{\rho g} + z_2\right) =$$

$$\frac{V_2^2}{2g} - \frac{V_1^2}{2g}$$

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

$d_1 = 300$

$d_2 = 150mm = 0.3m$

$A_1 = 0.07069 m^2$

$A_2 = 0.0177 m^2$

$Q = 10 lit/sec = 0.04 m^3/sec$

$z_1 = 10m$

$z_2 = 6m$

$P_1 = 100 kN/m^2$, $P_2 = ?$

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

But $Q = A_1 V_1$

$$V_1 = \frac{Q}{A_1} = \frac{0.04}{0.07059}$$

$V_1 = 0.5658 = 0.57 m/s$

Then $$V_2 = \frac{Q}{A_2} = \frac{0.04}{0.0177}$$

$V_2 = 2.2598 = 2.26 m/s$

$$\frac{P_1}{\rho g} (z_1 - z_2) + \left(\frac{V_1^2}{2g} - \frac{V_2^2}{2g}\right) = \frac{P_2}{\rho g}$$

$$\frac{400}{9.81} + (10 - 6) + \left(\frac{0.57^2 - 2.26^2}{2 \times 9.81}\right) = \frac{P_2}{9.81 kN}$$

$$40.77 + 4 + (-0.2435) = \frac{P_2}{9.81 kN}$$

10) Reading of manometer = 170 mm

= 0.17 m

Specific gravity of mercury = 13.6

" " " seawater = 1.026

$y = 0.17$ m

for $h = y\left(\frac{S_{hc}}{S_L} - 1\right)$