H —— 38

Th —— 23

TIMOTHY JACOB MIYENSEIGHA MARVELOUS
COMPUTER ENGINEERING
18/ENG02/094
FLUID MECHANICS
ASSIGNMENT

1.) $V = 5ms^{-1}$, $V_2 = 2ms^{-1}$

$PT_1 = 2.5m$, $PT_2 = ?$

$PT_1 - PT_2 = 0.35\frac{(V_1 - V_2)^2}{2g} = \frac{0.35 \times 3^2}{2 \times 9.81} = 0.161$

$\therefore PT_1 - PT_2 = 0.161$

$2.5 - PT = 0.161$

$PT_2 = 2.5 - 0.161$

$PT_2 = 2.67m$

2.) $200$

$= 0.20m$

$A = \pi d^2$, $PT = \frac{\pi (0.20)^2}{A} = 0.0514m^2$

$P_1 = 17.658N/cm^2 = \frac{17.658}{10.6} = 1765800$

Specific gravity of mecury $= 13.6$

$\frac{P_1}{10} = \frac{P_1}{Pg} = \frac{17.658 \times 10^{-6}}{1000 \times 9.81} = 1.8 \times 10^{-9}$

Vaccum pressure $= \frac{P_2}{10} = 300mmHg$

$d_2 = 100mm = 0.1$

$0.30 \times 13.6$ $A_2 = \frac{Ad^2}{4} = \frac{A(0.10)^2}{4} = 7.85 \times 10^{-3}$

$P_1 = -4.08$

$h = 1.8 \times 10^{-4} \times 4.08 = 4.080000000\,m$, 4.)

$h = \frac{P_1}{w} - \frac{P_2}{w}$

$$actual = \frac{(d P_1 P_2 \sqrt{2g})}{\sqrt{P_1^2 - P_2^2}}$$

$$= \frac{0.98 \times 0.0314 \times 7.815 \times 10^{-3} \sqrt{2 \times 9.81 \times 4.080}}{\sqrt{(0.031)^2 - (7.85 \times 10^{-3})^2}}$$

$$= 0.071086916665$$

8. $d_1 = 150\,mm = 0.15\,m$ 5.)

pipe diameter $d_2 = 300\,mm - 0.30\,m$

$$A_2 = \frac{Ad^2}{4} = \frac{3.142 \times 0.15^2}{4} = 0.0177\,m$$

$$A_2 = \frac{\pi (0.30)^2}{4} = 0.0707\,m^2$$

$y = 580\,mmHy = 0.50\,mHy$

$Cd = 0.64$

$$h = \frac{\text{Sg of } hg - \text{Sg of } 0.1}{\text{Sg of } 0.1} \times y = \frac{13.6 - 0.9}{0.9} \times 0.5$$

$= 7.00\,m$

Rule of flow; $actual = \frac{Cd A_2 A_1 \sqrt{2gh}}{\sqrt{A_1^2 - A_2^2}}$

$$= \frac{0.64 \times 0.0707 \times 0.0177 \sqrt{2 \times 9.81 \times 7.00}}{\sqrt{(0.0708)^2 - (0.0177)^2}}$$

$= 0.1377$

4.) $v = \sqrt{2gh}$

$H = \gamma\left(\frac{\text{5g of mecury} - \text{5g of water}}{\text{5g of water}}\right)$

$H = 8.17\left(\frac{13.6 - 1.0261}{1.026}\right) = 2.0842\text{m}$

$v = \sqrt{2 \times 9.81 \times 2.0842}$

$= 6.39\text{ms}^{-1}$

∴ Speed of Submarine $= 6.39\text{ms}^{-1}$

5.) Actual flowrate $Q = 5\text{dm}^3/\text{min} = 8.33 \times 10^{-5}$ m3/s

$p = 15\text{ bar} = 15 \times 10^5\ \text{N/m}^2$

$N = 17\text{revey/min} = 28.33\text{ p.s/sec}$

$T = 15\text{N/m}$ Normal displacement $= 100\text{cm}^3/\text{rev}$

$= 1 \times 10^{-5}\text{m}^3/\text{rev}$