1 $\frac{P_{tanque}}{\rho_{gasolina}} + \frac{V^2}{2} = 0{,}3g$

$$V^2 = 0{,}6g + \frac{2P_{tanque}}{\rho_{gasolina}}$$

$$\boxed{V = \sqrt{0{,}6g + \frac{2 \cdot P_{tanque}}{\rho_{gasolina}}}}$$

Assumindo gasolina imcompressível, regime permanentte e desprezando forças dissipativas.

(2) Regime permanente, fluido incompressível, desprezando atrito. $V_1 \approx 0$ (tubo), $z_1 = 0$.
$V_2 = 0$, $P_2 = P_{atm}$

$$\frac{P_1}{\rho} + \frac{v_1^2}{2} + g z_1 = \frac{P_2}{\rho} + \frac{v_2^2}{2} + g z_2$$

$$\frac{P_1}{\rho} + 0 + 0 = \frac{P_{atm}}{\rho} + 34g$$

$$P_1 = P_{atm} + 34\rho g$$

$$\boxed{P_1 = 333{,}2\ KPa}$$

3 $$\frac{P_1}{\rho_1} + \frac{v_1^2}{2} + g z_1 = \frac{P_2}{\rho_2} + \frac{v_2^2}{2} + g z_2$$

$$\frac{P_1}{\rho} + \cancel{g z} = \frac{P_{atm}}{\rho} + \frac{41{,}6}{2} + \cancel{g z}$$

$$P_1 = P_{atm} + \frac{41{,}6\,\rho}{2}$$

$$\boxed{P = 26\,Pa}$$

(4) Considerando regime permanente, ar incompressível, atrito nulo.

$$\frac{P_1}{\rho g} + \frac{v_1^2}{2g} + z_1 = \frac{P_2}{2g} + \frac{v_2^2}{2g} + z_2.$$

$$\frac{P_1}{\rho g} + \frac{v_1^2}{2g} = \frac{P_2}{\rho g} \Rightarrow \boxed{v_1 = \sqrt{\frac{2\Delta P}{\rho}}}$$

$\Delta P = \rho_{água}\, g h = 5,6$

$$v_1 = \sqrt{\frac{2 \cdot 5,6}{1,25}} = 2,99$$

$$\boxed{v = 2,99 \text{ m/s}}$$

5 Hipóteses: regime permanente, fluido incompressível, forças dissipativas (atrito) desconsideradas.

$$\frac{P_{tanque}}{\rho_{água}} + \frac{v_1^2}{2} + 15g = \frac{P_{atm}}{\rho_{água}} + \frac{v_2^2}{2} + hg$$

$$3 \cdot 10^2 + 15g = 10^2 + hg$$

$$h = \frac{3 \cdot 10^2 + 15g - 100}{g} = 21,9$$

$$\boxed{h = 21,9m}$$

Digitalizado com CamScanner

c) Hipóteses: regime permanente, fluido incompressível, atrito desprezado.

$$\frac{P_{tanque}}{\rho_{água}} + \frac{v_1^2}{2} + g z_1 = \frac{P_{atm}}{\rho_{água}} + \frac{v_2^2}{2} + g z_2$$

$$\frac{250 \cdot 10^3}{\rho_{água}} + 2,5g = \frac{P_{atm}}{\rho_{água}} + \frac{v_2^2}{2}$$

$$v_2^2 = \frac{150 \cdot 10^3}{\rho_{água}} + 2,5g$$

$$\boxed{v = 13,21 \, m/s}$$

8) Hipóteses: Regime permanente e incompressível, níveis de água constantes.

$\dot{m} = \rho Q = 1000 \cdot 100 = 10^5 \, Kg/s$

Fazendo $z_2 = 0$, $P_1 = P_2 = P_{atm}$ e $V_1 = V_2 = 0$, temos:

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

$$h_{turbina} = z_1 - h_L = 85m$$

$$W_{turbina} = \dot{m} g h = 10^5 \cdot 9{,}81 \cdot 85 = 83{,}4 \, MW$$

$$W_{útil} = 0{,}8 \cdot W_{turbina} = 66{,}72 \, MW$$

$$\boxed{W = 66{,}72 \, MW}$$

Digitalizado com CamScanner