

السؤال الأول (10 درجات):

$$P_A + (0.89 * 1000 * 9.81 * 1.1) + (1000 * 13.6 * 9.81 * 0.3) - (1.6 * 1000 * 9.81 * 0.8) = P_B$$

$$P_A - P_B \approx -37.1 * 10^3 Pa$$

السؤال الثاني (15 درجة):

$$F_x = \gamma \cdot h_c \cdot A$$

$$h_c = 2 + \frac{D}{2} = 2 + \frac{2}{2} = 3m$$

$$A = 2 * 1 = 2m^2$$

$$F_x = 9810 * 2 * 3 = 58860N$$

$$F_y = 1 * \gamma * A$$

$$F_y = 9810 * \pi \frac{R^2}{2} = 15409N$$

$$F = \sqrt{F_x^2 + F_y^2} = \sqrt{58860^2 + 15409^2} = 60.843 * 10^3 N$$

$$\text{tg } \theta = \frac{F_y}{F_x} = \frac{15409}{58860} \rightarrow$$

$$\theta = 14.6$$

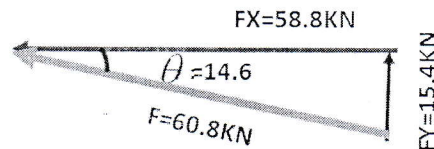
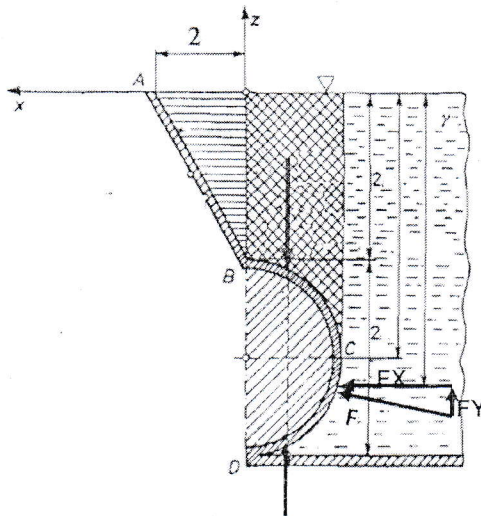
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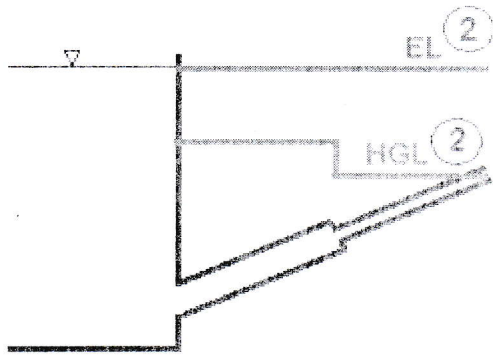
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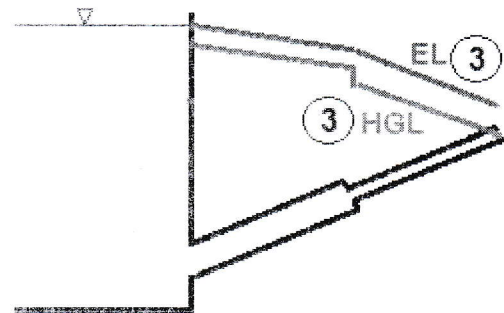


د. محمد

سائل مثالي



سائل حقيقي

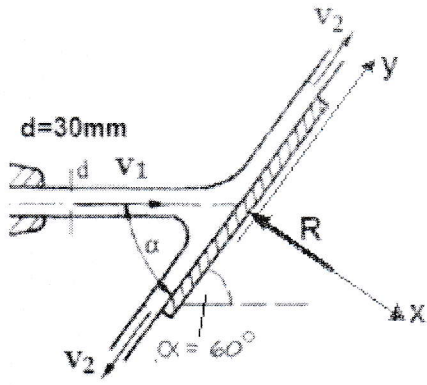


3- يمكن إيجاد الغزارة بإحدى الطريقتين:

<p>بتطبيق بيرنولي بين سطح الماء في الخزان (1) ونهاية الأنبوب (2):</p> $E_1 = E_2 + h_l$ $z_1 + \frac{P_1}{\gamma} + \frac{v_1^2}{2g} = z_2 + \frac{P_2}{\gamma} + \frac{v_2^2}{2g} + h_{f1} + h_{f2} + K_1 \frac{v_1^2}{2g} + K_2 \frac{v_2^2}{2g}$ $5 + 0 + 0 = 0 + 0 + \frac{v_2^2}{2g} + \lambda_1 * \frac{L_1}{D_1} * \frac{v_1^2}{2g} + \lambda_2 * \frac{L_2}{D_2} * \frac{v_2^2}{2g}$ $v_1 = v_2 \frac{A_2}{A_1} = v_2 \left(\frac{D_2}{D_1}\right)^2 = 0.25v_2$ $5 = \frac{v_2^2}{2g} + \lambda_1 * \frac{L_1}{D_1} * \frac{(0.25 * v_2)^2}{2g} + \lambda_2 * \frac{L_2}{D_2} * \frac{v_2^2}{2g}$ <p>بالتعويض ينتج:</p> $v_2 = 4.38 \text{ m/s}$ $Q = v_2 * A_2 = 4.38 * \frac{\pi D_2^2}{4} = 0.002 \text{ m}^3/\text{s}$	<p>باستبدال المنظومة بأنبوب مكافئ حيث:</p> $h_l = K_e * Q^2, \quad K_e = K_1 + K_2$ $K_1 = 0.0826 * \left(\lambda_1 * \frac{L_1}{D_1^5}\right)$ $= 0.0826 * \left(0.02 * \frac{5}{0.05^5}\right) = 26432$ $K_2 = 0.0826 * \left(\lambda_2 * \frac{L_2}{D_2^5}\right)$ $K_2 = 0.0826 * \left(0.02 * \frac{5}{0.025^5}\right) = 845824$ $K_e = K_1 + K_2 = 26432 + 845824 = 872256$ $Q = \sqrt{\frac{h_l}{K_e}} = \sqrt{\frac{5}{872256}} = 0.002 \text{ m}^3/\text{s}$
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السؤال الرابع: (14 درجة)

$C_d = \frac{Q_{ac}}{Q_{th}} \dots \dots \dots (1)$ $Q_{th} = v * A = \sqrt{2gh} * (a) = \sqrt{19.62 * 4} * 0.0005 = 0.0044 \text{ m}^3/\text{s} \dots \dots \dots (2)$ $Q_{ac} = \frac{V}{t} = \frac{0.015}{5} = 0.003 \text{ m}^3/\text{s} \dots \dots \dots (2)$ $C_d = \frac{0.003}{0.0044} = 0.68 \dots \dots \dots (1)$ <hr/> $C_v = \frac{x}{2} * \sqrt{\frac{1}{y * h}} = \frac{3.92}{2} * \sqrt{\frac{1}{1 * 4}} = 0.98 \dots (3)$ $C_c = \frac{C_d}{C_v} = \frac{0.68}{0.98} = 0.69 \dots \dots \dots (2)$	$x = v * t \rightarrow t = \frac{x}{v}$ $y = \frac{1}{2} * g * t^2 \rightarrow y = \frac{1}{2} * g * \frac{x^2}{v^2} \rightarrow v^2 = \frac{1}{2} * g * \frac{x^2}{y}$ $2 * g * (H - y) = \frac{1}{2} * g * \frac{x^2}{y} \rightarrow x^2 = 4 * y * (H - y)$ $\frac{\partial x}{\partial y} = 0 \rightarrow y = \frac{H}{2} \dots \dots \dots (3)$
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لحساب (F) نطبق معادلة تغير كمية الحركة على حجم التحكم

$$\Sigma F = \rho \times Q \times (v_2 - v_1)$$

$$-R = \rho Q(0 - v_1 * \cos(30))$$

$$R' = \rho Q v_1 * \cos(30) = \rho A v_1^2 \cos(30)$$

$$A = \frac{\pi d^2}{4} = \frac{\pi (0.03)^2}{4} = 0.0007$$

$$R' = 1000 \times 0.0007 \times 7^2 * 0.866 = 30 \text{ N} \dots \dots \dots (8)$$

$$F = R' = 30 \text{ N} \dots \dots \dots (2)$$

د. وسام نخله