

سلم تصحيح ميكانيك الموائع الفصل الأول 2025/2024

السؤال الأول (10 درجات):

$$P_{air} = 9.81 \cdot 13600 \cdot 0.2286 - 9.81 \cdot 900 \cdot (0.9144 + 0.1524) = 21.08 kPa$$

(10)

السؤال الثاني (15 درجة):

$$F_R = \gamma \cdot A \cdot h_c$$

$$y = \frac{h}{\sin 60} = \frac{25}{\sin 60} = 28.86 m$$

$$y_c = \frac{28.86}{2} = 14.43 m$$

$$h_c = y_c \cdot \sin 60 = 14.43 \cdot \sin 60 = 12.5 m$$

$$A = y \cdot 1 = 1 \cdot 28.86 = 28.86 m^2$$

$$F_R = \gamma \cdot A \cdot h_c = 9810 \cdot 28.86 \cdot 12.5 = 3538.96 kN$$

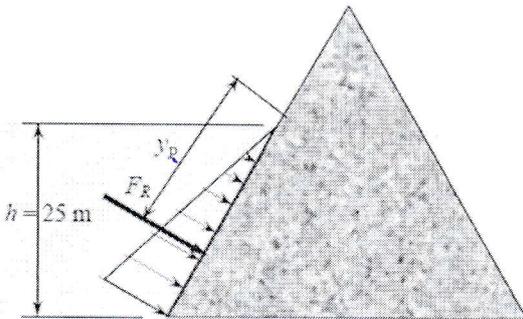
$$y_R = \frac{I_x}{A \cdot y_c} + y_c$$

$$I_x = \frac{bh^3}{12} = \frac{1 \cdot (28.86)^3}{12} = 2003.123 m^4$$

$$y_R = 19.24 m$$

8

(4)



(3)

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د. صلاح محمد

السؤال الرابع: (12 درجة)

• $P_3 = P_4$ } (4)
 * $\gamma_{\text{ماء}} \cdot h = \gamma_w \times 0.67 + P_1$

تطبيق برنولي بين (1) و (2)

(4)
$$z_1 + \frac{P_1}{\gamma} + \frac{v_1^2}{2g} = z_2 + \frac{P_2}{\gamma} + \frac{v_2^2}{2g}$$

$$0 + \frac{P_1}{\gamma} + \frac{1}{19.62} = 2.44 + 0 + \frac{(4)^2}{19.62}$$

$$\frac{P_1}{\gamma} = 3.2 \text{ m} \Rightarrow P_1 = 3.2 \times 9810 = 31436 \text{ Pas}$$

* بالتعويض

(4)
$$13.6 \times 1000 \times 9.81 \times h = 9810 \times 0.67 + 31436$$

$$h = 0.28 \text{ m} = 28 \text{ cm}$$

السؤال الخامس: (10 درجات)

$R_{L2} = R_{L3}$ } (5)
 $K_2 Q_2^2 = K_3 Q_3^2$

$$\frac{Q_3}{Q_2} = \sqrt{\frac{K_2}{K_3}}$$

$$K_2 = 0.0826 \lambda_2 \frac{L_2}{D_2^5}$$

$$K_3 = 0.0826 \lambda_3 \frac{L_3}{D_3^5}$$

(5)
$$\left. \begin{matrix} D_2 = D_3 \\ \lambda_2 = \lambda_3 \end{matrix} \right\} \Rightarrow \frac{Q_3}{Q_2} = \sqrt{\frac{L_2}{L_3}}$$

$$= \sqrt{\frac{60}{40}} = 1.22$$

$$\frac{Q_3}{Q_2} = 1.22$$

السؤال الثالث: (10 درجات)

• $m_{in} = m_{out}$
 $m_1 = m_2 + m_3 + \rho \cdot \frac{dR}{dt} \cdot A$

$\rho Q_1 = \rho Q_2 + \rho Q_3 + \rho \cdot \frac{dR}{dt} \cdot A$

$v_1 \cdot A_1 = v_2 \cdot A_2 + v_3 \cdot A_3 + \frac{dR}{dt} \cdot A$
 $8 \times 0.005 = 3 \times 0.002 + 4 \times 0.0013 + \frac{dR}{dt} \times 0.283$

$\frac{dR}{dt} = 0.1 \text{ m/s}$ ----- (6)

• $\frac{dR}{dt} \times 0.283 = v_4 \cdot A_4$ } (4)

$0.1 \times 0.283 = v_4 \cdot 0.002$

$v_4 = 14.4 \text{ m/s}$

السؤال الخامس: (13 درجة)

$\Sigma \vec{F} = \rho Q (\vec{v}_2 - \vec{v}_1)$ (1)

بالإسقاط على محور OX :

$-R_x + P \cdot A = \rho Q (0 - v_1)$

تطبيق برنولي بين (1) و (2)

(3)
$$z_1 + \frac{P_1}{\gamma} + \frac{v_1^2}{2g} = z_2 + \frac{P_2}{\gamma} + \frac{v_2^2}{2g} + 0.3 \frac{v_1^2}{2g}$$

$$\left. \begin{matrix} D_1 = D_2 \\ v_1 = v_2 \\ z_1 = z_2 \end{matrix} \right\} \Rightarrow \frac{P_1}{\gamma} = 0.3 \frac{v_1^2}{2g}$$

$$\frac{P_2}{\gamma} = 0 \Rightarrow P_1 = 864 \text{ N/m}^2$$

$-R_x + 864 \times 0.125 = 1000 \times 0.3 \times 2.4$

$R_x = 828 \text{ N}$ ----- (3)

بالإسقاط على محور OY :

$R_y = \rho Q (v_2 - 0)$

$R_y = 1000 \times 0.3 \times 2.4 = 720 \text{ N}$ (3)

$R = \sqrt{R_x^2 + R_y^2}$

$= \sqrt{(828)^2 + (720)^2} = 1097 \text{ N}$

$F = R = 1097 \text{ N}$ ----- (3)

تعاكسها بالإسقاط