

۱۳ تادی حسابان دهنده این است $\leftarrow p_2, p_3, p_4$ در همه جهات به دلیل نفس برکنی نداشته و جهت مکرر
 بهم برابر است که این همان قانون پاسکال است \checkmark گزینه ۳ \checkmark

(5)

$$p_A \cdot y h_1 = (9/851) \cdot 1.5 \cdot 1/2 = 11557 p_A \quad \checkmark$$

$$p_A - y(h_1) - p_B = 0 \rightarrow p_A - 15 \cdot 1.5 \cdot 9/851 = -2942 p_A \xrightarrow[\text{با } h_2]{\text{نسبت}} p_C = -2942 p_A \quad \checkmark$$

$$p_C + \cdot 15 - (19 + 15 + 15 + 19) \cdot 15 - p_D = 0 \rightarrow p_D = -(p_C + 45) = -14145 p_A \quad \checkmark$$

(14)

$$\frac{dp}{dx} = \gamma \rightarrow dP = \gamma dx \rightarrow \int_a^b dP = \int_a^b \gamma dx \rightarrow \int_a^b \gamma dx = \int_a^b (\gamma h + \gamma) dx$$

$$\rightarrow P = \gamma/2 h^2 + \gamma_0 h \quad \checkmark$$

(15)

$$P_{\text{میان}} = p_0 + \gamma h = (100) + 9/851 \cdot 1.5 \cdot 1/2 + 9/851 \cdot 1.5 \cdot 1/2 + \dots = 2007/851 + \dots = 1.1757/851 p_A \quad \checkmark$$

$$P_{1,2} = \rho A l \quad / \quad \epsilon f_{nc} \rightarrow -PA + P_2 A + \sigma \pi d = \dots \rightarrow (109)$$

$$-PA + (P_2 + \sigma A) + \gamma l A + \sigma \pi d = \dots$$

$$P_{1,2} \theta_1 = P_{2,2} \theta_2 \rightarrow P_{1,2} (l+1) = P_{2,2} (1) A \rightarrow \frac{P_{1,2}}{P_{2,2}} = \frac{l+1}{1+l}$$

$$\rightarrow \frac{1}{l+1} A + P_{2,2} A + \gamma l A + \sigma \pi d = \dots \rightarrow$$

$$1.122 \times \left(1 - \frac{1}{l+1}\right) + \left(\frac{1}{1+l} l + 1\right) + \frac{1.122 \sigma}{1.122 \pi}$$

$$\rightarrow 2.1.122 + 1.122 \cdot l - 1.122 \dots \rightarrow \underline{l = 1.122 m}$$

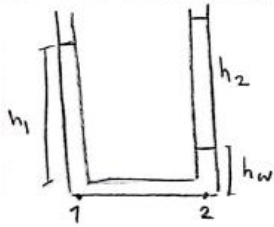
$$P_{1,2} \rightarrow P_{1,2} + \gamma h_1 \rho l_{1,2} + \dots \rightarrow P_{1,2} - \gamma h_1 \rho - \gamma h_2 \rho + P_{2,2}$$

$$= \dots + 1.122 \dots \rightarrow 1.122 \dots = \dots$$

$$P_{1,2} \rightarrow P_{1,2} = \rho \cdot \dots + P_{2,2} = \dots + P_{2,2}$$

$$P_{1,2} = \dots \rightarrow P_{1,2} = \dots \rightarrow P_{1,2} = \dots (127)$$

$$P_{1,2} = \dots \rightarrow P_{1,2} = \dots$$



$$P_1 = P_2$$

$$h_1 \gamma_w = h_2 (\rho_{oil} g) + h_w \gamma_w \rightarrow 0,7 \times 9810 = 6 h_w \times 790 \times 9,81 + h_w \times 9810$$

$$\rightarrow h_w = 0,122 \quad \checkmark, \quad h_2 = 6 \times 0,122 = 0,732 \quad \checkmark$$

-12-1

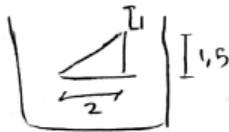
$$D = \rho g h = \gamma_w \times 5 = 49.050$$

-15-1

$$F = PA \Rightarrow 5 \gamma_w \times 0,99 = 4,95 \gamma_w$$

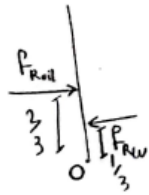


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$$F_R = \gamma h_{cA} = \gamma_w \left(\frac{1}{2} + \frac{2}{3} \times \frac{3}{2} \right) \times \frac{1,5 \times 2}{2} = 3 \gamma_w = 2943 \text{ kN} \quad -16-1$$

$$y_R = \frac{I_{xc}}{h_{c1} A} + h_{c1} = \frac{b a^3}{3 \times 2 \times 1,5} + 2 = 2,0625 \quad \checkmark$$



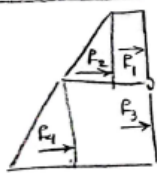
$$F_{Roil} = \frac{1}{2} \gamma_{oil} h^2 b = \frac{1}{2} \times 200 \times 9,81 \times 2^2 \times 5 = 78980$$

87-2

$$F_{RW} = \frac{1}{2} \gamma_w h^2 b = \frac{1}{2} \times 9810 \times 1^2 \times 5 = 24525$$

$$F_{Rtotal} = F_{Roil} - F_{RW} = 53955 \approx 54000 \quad \checkmark$$

$$\sum \Pi_0 = F_{Roil} \times \frac{2}{3} - F_{RW} \times \frac{1}{3} - F_{Rtotal} \times y_R = 0 \rightarrow y_R = 0,82 \text{ m} \quad \checkmark$$



در صورتی درجه از هم لنگر که نیز در طی دارا در با ل نیز از این است پس نسبت به اول است

88-2

$$F_1 l_1 + F_2 l_2 + F_3 l_3 \gg F_4 l_4$$

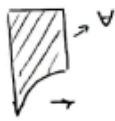
$$F_1 = \gamma h l a \quad F_2 = \frac{\gamma l^2}{2} a \quad F_3 = \gamma (h+l) l b \quad F_4 = \frac{\gamma l^2}{2} b$$

$$\Rightarrow a(3 + \frac{l}{h}) \gg b(3 + 5 \frac{l}{h}) \xrightarrow{h \gg l} a \gg 2b \rightarrow \frac{a}{b} \gg 2 \quad \checkmark$$

$$d_A = 2\pi R \cos \theta \times R d\theta = 2\pi R^2 \cos \theta d\theta \quad h = d - R \sin \theta \quad F_z = \int -\gamma h \sin \theta d\theta \quad -89-2$$

$$\rightarrow F_z = \int_{-\pi/2}^{\pi/2} -\gamma (d - R \sin \theta) \sin \theta (2\pi R^2 \cos \theta d\theta) = -2\pi R^2 \gamma d \int_{-\pi/2}^{\pi/2} \frac{\sin 2\theta}{2} d\theta + 2\pi R^3 \gamma \int_{-\pi/2}^{\pi/2} \sin^2 \theta \cos \theta d\theta \quad \checkmark$$

$$= -\frac{4}{3} \pi R^3 \gamma \quad \checkmark$$



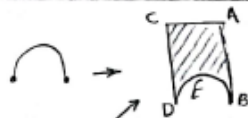
$$F_H = \gamma A h_c = 9810 \times 1,5 \times 1,8 \times (2 + \frac{1,5}{2}) = 72839 \approx 72840$$

91-2

$$F_V = \gamma V = 9810 \times (1,8 \times 1,5 \times (2 + 1,5) - \frac{1}{4} \pi \times 1,5^2 \times 1,8) = 61500$$

$$F_R = \sqrt{F_H^2 + F_V^2} = 9533 \quad \tan^{-1}(\frac{F_H}{F_V}) = 57,2 \quad \checkmark$$

$$y_R = R \cos \theta = 0,813 \text{ m} \quad \checkmark$$



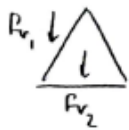
$$h = \frac{70000}{15000} = 4,667 \rightarrow AB = 3,167$$

98-2

$$F_V = \gamma V = 9810 \left((\pi \times 2 \times 3,167) - \frac{1}{2} \times \frac{4}{3} \times \pi \times 4 \right) = 117825 \quad F_b = \frac{1}{2} (F_V - W) = 56662 \quad \checkmark$$

$$F_{r1} = \gamma h_1 = 0,5 \times 2 \times \gamma_w \quad 2\gamma_w = 0,5 \times \delta_w h \Rightarrow h = 4$$

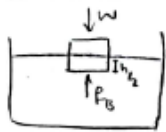
- 11 - 2



$$P_{r1} = 0,5 \cdot \delta_w \times 4 \pi r^2 = 2 \pi r^2 \delta_w$$

$$P_{r2} = \delta_w \times \frac{2}{3} \pi r^2 = \frac{2}{3} \pi r^2 \delta_w$$

$$P_{rT} = P_{r1} + P_{r2} = \frac{8}{3} \pi r^2 \gamma_w = 8,38 \delta_w \rightarrow \text{نزنده 9} \checkmark$$



$$F_B = \gamma_w V_{Sub} = 9 \times 10^3 \times \frac{1}{2} V = \frac{1}{2} \gamma_w V \rightarrow P_1 = P_w \times \frac{1}{2} \checkmark$$

$$W = \frac{1}{2} \gamma_w V \quad P_{B2} = 0,8 \gamma_w V_{Sub}$$

$$\frac{1}{2} \gamma_w V = 0,8 \gamma_w V_{Sub} \rightarrow V_{Sub} = \frac{5}{8} V = 0,625 V_{total} \rightarrow \text{نزنده 1} \checkmark$$

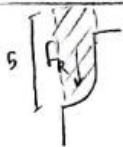
- 11 - 2

$$F_B = W \rightarrow y_{P_B} = (0,1 \times 0,1) \times (1 + y) = 5 \cdot 0,8 \times 9810 \times 0,1 \times 0,1 \times (2,5y + y) = 5$$

$$y = 0,18 \text{ m} = 18 \text{ mm}$$

بابع به اندازه 0,098 م بالا می آید پس ارتفاع کل آب 0,098 م است

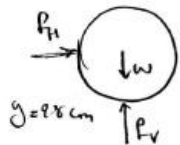
- 92 - 2



$$P_{oil} = 3 \times 8000 + 16000 = 40000 \rightarrow \frac{40000}{8000} = 5 \text{ m}$$

$$P_r = \gamma V = 8000 \times (5 \times 2 \times 1 + \frac{\pi}{4} \times 4) = 105,13 \approx 105 \text{ تن} \checkmark$$

- 10 - 2

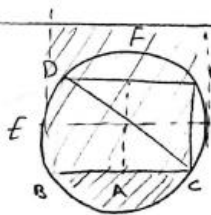


$$l = 3 \text{ m} \quad D = 0,5 \text{ m} \quad \text{نیز در حال انقباض و BC و AB که در افقی می مانند در نقطه نیروی را دارد}$$

$$P_H = \gamma \times \frac{K_1}{2} \times R_B = 9800 \times \frac{1,25}{2} \times 3 \times 1,25 = 918,75$$

سطح مقطع نیز یک مستطیل به طول 0,5 و ارتفاع 1,25 است.

- 14 - 2



$$F_H = \gamma A_{BD} h_c = 23,4$$

$$F_V = \gamma_w V = \gamma_w \left(\frac{1}{2} \times 1,294 \times 1 \times 1,2 + \frac{1}{2} \times \frac{1}{4} \times \pi \times 1,83^2 \times 1 \right) = 9,81 \left((1,294 \times 1 \times 1,2) + \right.$$

$$\left. \left(\frac{1}{2} \times 1,294 \times 1 \times \frac{1,294}{2} \right) + \frac{1}{2} \times \frac{1}{4} \times \pi \times 1,83^2 \times 1 \right) = 36,3 \checkmark$$

- 17 - 2

(85)

$$F_{HAB} = \rho g h_c \cdot A / \rho + S.G. \cdot \gamma_w \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \gamma_w = 163 \gamma_w = 163 \cdot 9.81 \gamma_w = 1590 \gamma_w$$

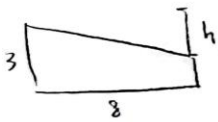
$$\rho + 163 \cdot 9.81 \gamma_w \cdot (1 + \frac{1}{2} - \frac{1}{2}) \rightarrow \rho = 3291 \gamma_w$$

$$F = (3291) \cdot (1.422) \cdot (1.411) = 2449 / 162 \text{ N}$$

$$F_B \left(\frac{l_{AC} \cos \alpha}{2} \right) = w \cdot l_{AB} \cdot \frac{1}{2} \cos \alpha \rightarrow \gamma_w A l_{AC}^2 = \gamma_c A l_{AB}^2$$

$$l_{AC}^2 = S.G. \cdot l_{AB}^2$$

∴ $l_{AC} = \sqrt{S.G.} \cdot l_{AB}$



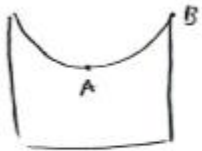
$$\tan \alpha = \frac{-ay}{y} = \frac{-1.5}{1} = -1.5$$

$$h = 1.5 \times 8 = 12 \quad V = 8 \times 3 \times 2 - 8 \times 2 \times \left(\frac{3+3-1.2}{2} \right) = 9.6 \text{ m}^3$$

$$P_2 = \frac{\rho r^2 \omega^2}{2} - \frac{\gamma_c}{2} = \frac{\rho \times 0.1 \times \omega^2}{2} \quad \rho = \rho g h_1 = 9810 \times 0.3 = 2943$$

$$P = P_1 + P_2 \rightarrow 1770 + P_2 = 2943 \rightarrow P_2 = 1173$$

$$1173 = \frac{1000 \times 0.12 \times \omega^2}{2} \rightarrow \omega = 15.316 \text{ rad/s}$$



$$P_A = P_B \rightarrow P_A = \frac{\rho r^2 \omega^2}{2} - \frac{\gamma_c}{2} + \frac{\gamma_w}{5} = P_B$$

$$P_B = \frac{1.3 \times 0.2^2 \times \omega^2}{2} - \frac{0.2 \omega^2 \times 0.2^2}{9} = 19.99 \omega^2 = 20 \omega^2$$