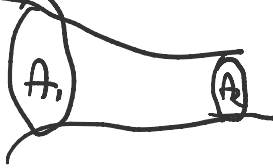


2 Set #3 FLUIDODINAMICA

461



$$A_2 = \frac{1}{20} A_1$$

$$P_1 - P_2 = 125 \text{ cm H}_2\text{O}$$

$$A_1 v_1 = A_2 v_2$$

$$P_1 + \frac{1}{2} \rho v_1^2 = P_2 + \frac{1}{2} \rho v_2^2$$

$$1 \text{ cm H}_2\text{O} = \rho \cdot g \cdot h = 1000 \cdot 9.8 \cdot 10^{-2} = 98 \text{ Pa}$$

$$A_1 = 20$$

$$A_2$$

$$v_2 = 20 v_1$$

$$P_1 - P_2 = \frac{1}{2} \rho (v_2^2 - v_1^2)$$

$$P_1 - P_2 = \frac{1}{2} \cdot 399 v_1^2$$

$$v_1 = \sqrt{\frac{2(P_1 - P_2)}{399 \cdot 1000}}$$

$$= \sqrt{\frac{2 \cdot 125 \cdot 98}{1000 \cdot 399}} \approx \sqrt{\frac{1}{4.4}}$$

$$= 0.15 \text{ m}$$

$$= 0,25 \frac{m}{s}$$

$$\boxed{456}$$

$$R = \frac{8\eta l}{\pi R^4} \quad Q = \frac{\Delta P}{R}$$

$$\Delta P_2 = 2\Delta P_1 \quad I R = \Delta V$$

$$l_2 = \frac{1}{2} l_1 \rightarrow R_2 = \frac{1}{2} R_1$$

$$\frac{Q_2}{Q_1} = ? \quad \frac{Q_2}{Q_1} = \frac{2}{\frac{1}{2}} = 4$$

$$\Delta P_2 = \frac{1}{2} \Delta P_1$$

$$r_2 = \frac{1}{2} r_1 \rightarrow R_2 = 16 R_1$$

$$\frac{Q_2}{Q_1} = \frac{\frac{1}{2}}{\frac{16}{1}} = \frac{1}{2} \cdot \frac{1}{16} = \frac{1}{32}$$

$$\boxed{342}$$

MOTO ARMONICO

$$F = -K \cdot x$$

$$\omega = \frac{2\pi}{T} = 2\pi f$$

$$d = \omega T \quad \dots - \sqrt{v}$$

$$f = \frac{\omega}{2\pi} \quad \omega = \sqrt{\frac{k}{m}}$$

$$F = -kx$$

$$ma = -kx$$

$$m\omega^2 x = kx$$

$$\omega = \sqrt{\frac{k}{m}}$$

$$f = \sqrt{\frac{k}{m}} \cdot \frac{1}{2\pi} =$$

$$= \sqrt{\frac{1600}{0,250}} \cdot \frac{1}{2\pi} =$$

$$= \sqrt{\frac{16 \cdot 100}{\frac{1}{4}}} \cdot \frac{1}{2\pi} =$$

$$= \frac{4 \cdot 10}{\frac{1}{2}} \cdot \frac{1}{2\pi} = \frac{40}{\frac{1}{2}} \cdot \frac{1}{2\pi}$$

$$= \frac{80}{2\pi} = \frac{40}{\pi} \approx 13 \text{ Hz}$$

347

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$$\omega = 20 \frac{\text{rad}}{\text{s}}$$

$$a = ? \quad x = 10 \text{ cm}$$

$$a = -\omega^2 x$$

$$x = A \sin \omega t$$

$$v = A \omega \cos \omega t$$

$$a = A \omega^2 \sin \omega t$$

$$a = -\omega^2 x = -400 \cdot 0,1$$
$$= 40 \frac{\text{m}}{\text{s}^2}$$

550

$$m = 2,5 \text{ Kg}$$

$$Q = 5 \text{ Kcal}$$

$$\Delta T = 20^\circ \text{C} \quad c = ?$$

$$Q = c \Delta T = c m \Delta T$$

$$c = \frac{Q}{m \Delta T} = \frac{5 \text{ Kcal}}{2,5 \cdot 20}$$

$$= \frac{5}{2,5 \cdot 20} = \frac{1}{10} = 0,1 \frac{\text{Kcal}}{\text{Kg} \cdot ^\circ \text{C}}$$

550

$$m_1 = 30 \text{ Kg} \quad \Delta T_1 = 20^\circ \text{C}$$

$$m_2 \cdot \Delta T_2 = 15^\circ \text{C}$$

$$M, \Delta T_2 = 15^\circ \text{C}$$

$$\begin{cases} Q = c m \Delta T_1 \\ Q = c M \Delta T_2 \end{cases}$$

$$m \Delta T_1 = M \Delta T_2$$

$$M = \frac{m \Delta T_1}{\Delta T_2} =$$

$$\cancel{c} m \Delta T_1 = \cancel{c} M \Delta T_2$$

$$M = \frac{302 \cdot 20}{15} = 40 \text{ kg}$$

$$\boxed{1162}$$

$$f = 500 \text{ Hz}$$

$$v_s = 85 \frac{\text{m}}{\text{s}}$$

$$v = 340 \frac{\text{m}}{\text{s}}$$

$$f' = ?$$

$$f' = f \frac{v}{v - v_s} =$$

$$= 500 \cdot \frac{340}{340 - 85} =$$

$$\approx 500 \cdot \frac{340}{260} = 680 \text{ Hz}$$

$$\boxed{555}$$

2 > 5

$$m_1 = 10 \text{ Kg} \quad T_1 = 40^\circ\text{C}$$

$$m_2 = 40 \text{ Kg} \quad T_2 = 10^\circ\text{C}$$

$$T_e = ?$$

$$Q = mc\Delta T$$

$$-m_1 c \Delta T_1 = +m_2 c \Delta T_2$$

$$-m_1 (T_e - T_1) = m_2 (T_e - T_2)$$

$$-m_1 (T_e + 273 - T_1 - 273) = m_2 (T_e - T_2)$$

$$-m_1 T_e + m_1 T_1 = m_2 T_e - m_2 T_2$$

$$-m_1 T_e - m_2 T_e = -m_1 T_1 - m_2 T_2$$

$$T_e = \frac{m_1 T_1 + m_2 T_2}{m_1 + m_2} = \frac{10 \cdot 40 + 40 \cdot 10}{50}$$

$$= \frac{800}{50} = 16^\circ\text{C}$$