

V Konkurs Fizyczny

Rozwiązania zadań finałowych

Zadanie 1.

(a) $|V_L - V_C| = E$;

(b) Gdy $V_L = V_C$ zawada ma wartość minimalną, a prąd osiąga maksimum.

Zadanie 2.

$$\frac{mg}{\sin(180^\circ - \beta)} = \frac{m\omega^2 R_Z \cos(\alpha)}{\sin(\beta - \alpha)}$$

$$\beta - \alpha \cong \frac{\omega^2 R_Z}{g} \cos(\alpha) \sin(\beta) \cong \frac{\omega^2 R_Z}{2g} \sin(2\alpha)$$

$$\max(\beta - \alpha) \Rightarrow \alpha = 45^\circ$$

$$\min(\beta - \alpha) \Rightarrow \alpha = 0^\circ; 90^\circ$$

Zadanie 3.

$$\frac{1}{2} kx^2 + \mu m_1 g x = m_2 g x \quad ; \quad kx \leq m_2 g + \mu m_1 g \Rightarrow \mu \geq \frac{m_2}{3m_1}$$

Zadanie 4.

$$\frac{m_{N_2}}{\rho_{N_2}} + \frac{m_{O_2}}{\rho_{O_2}} = \frac{m_{N_2} + m_{O_2}}{\rho} \Rightarrow \frac{m_{N_2}}{m_{N_2} + m_{O_2}} = \frac{\frac{1}{\rho} - \frac{1}{\rho_{O_2}}}{\frac{1}{\rho_{N_2}} - \frac{1}{\rho_{O_2}}}$$

Zadanie 5.

$$\begin{cases} E_1 = V_3 + V_2 \\ E_2 = V_2 - V_3 \\ V_1 C_1 = V_2 C_2 + V_3 C_3 \end{cases}$$

$$V_1 = \frac{(E_1 + E_2)C_2 + E_1 C_3}{C_1 + C_2 + C_3}$$

$$V_2 = \frac{(E_1 + E_2)C_1 + E_2 C_3}{C_1 + C_2 + C_3}$$

$$V_3 = \frac{E_1 C_1 - E_2 C_2}{C_1 + C_2 + C_3}$$