



**ΠΑΝΕΛΛΑΔΙΚΕΣ 2020
ΑΠΑΝΤΗΣΕΙΣ ΣΤΟ ΜΑΘΗΜΑ ΤΗΣ
ΦΥΣΙΚΗΣ
(ΝΕΟ ΣΥΣΤΗΜΑ)**

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**ΕΠΙΜΕΛΕΙΑ: ΚΕΜΕΝΕΣ ΝΙΚΟΣ, ΚΑΨΗΣ ΣΩΤΗΡΗΣ,
ΦΡΑΓΚΕΤΗ ΧΡΥΣΑ, ΚΑΛΙΑΚΑΤΣΟΥ ΙΩΑΝΝΑ**

Θέμα Α

Α1. γ

Α2. α

Α3. γ

Α4. δ

Α5. α. Σ β. Λ γ. Σ δ. Σ ε. Λ

Θέμα ΒΒ1. $v_A = 2v_{cm}$

$$v_{\Gamma} = \sqrt{v_{cm}^2 + \left(\frac{v_{cm}}{2}\right)^2} \Rightarrow v_{\Gamma} = \sqrt{\frac{5v_{cm}^2}{4}} \Rightarrow v_{\Gamma} = \frac{v_{cm}\sqrt{5}}{2}$$

$$\frac{v_{\Gamma}}{v_A} = \frac{\frac{v_{cm}\sqrt{5}}{2}}{2v_{cm}} \Rightarrow \frac{v_{\Gamma}}{v_A} = \frac{\sqrt{5}}{4}$$

Σωστό το (iii)

Β2. $v_2' = \frac{2m_1}{m_1+m_2}v_1$

$$P_1 = \frac{K_2'}{K_1} 100\% = \frac{\frac{1}{2}m_2 \frac{4m_1^2}{(m_1+m_2)^2} v_1^2}{\frac{1}{2}m_1 v_1^2} 100\% \Rightarrow P_1 = \frac{4m_1 m_2}{(m_1+m_2)^2} 100\%$$

$$v_1' = \frac{2m_2}{m_1+m_2}v_2$$

$$P_2 = \frac{K_1'}{K_2} 100\% = \frac{\frac{1}{2}m_1 \frac{4m_2^2}{(m_1+m_2)^2} v_2^2}{\frac{1}{2}m_2 v_2^2} 100\% \Rightarrow P_2 = \frac{4m_1 m_2}{(m_1+m_2)^2} 100\%$$

άρα $P_1 = P_2$ Σωστό το (ii)Β3. $P_B = P_O$ Bernoulli από σημείο της επιφάνειας $\rightarrow O$

$$p_{atm} + \rho g H = p_{atm} + \rho g h_1 + \frac{1}{2} \rho v_0^2 \Rightarrow v_0 = \sqrt{2g(H - h_1)}$$

$$t_{\pi\tau} = \sqrt{\frac{2h_1}{g}}, s = v_0 t_{\pi\tau} \quad (1)$$

$$t_1 = \sqrt{\frac{2(h_1 - h_2)}{g}}, \quad \frac{s}{2} = v_0 t_1 \Rightarrow s = 2v_0 t_1 \quad (2)$$

Από τις (1), (2):

$$v_0 t_{\pi\pi} = 2v_0 t_1 \Rightarrow \frac{2h_1}{g} = \frac{4 \cdot 2(h_1 - h_2)}{g} \Rightarrow$$

$$h_1 = 4h_1 - 4h_2 \Rightarrow h_1 = \frac{4}{3}h_2 \Rightarrow h_1 = \frac{7}{8}H$$

$$v_0 = \sqrt{2g\left(H - \frac{7}{8}H\right)} \Rightarrow v_0 = \frac{\sqrt{gH}}{2}$$

$$\Pi_0 = Av_0 \Rightarrow \Pi_0 = \frac{A}{2}\sqrt{gH} = \Pi \text{ \u03b1\u03c1\u03b1 \u03c3\u03c9\u03c3\u03c4\u03cc \u03c4\u03bf (i)}$$

Θ\u03b5\u03bc\u03b1 \u0393

$$\mathbf{F1.} F = F_L \Rightarrow F = \frac{B_1^2 L^2 v_{o\rho}}{R_{o\lambda}} \Rightarrow v_{o\rho} = 4m/s$$

$$\mathbf{F2.} F' = F_L' \Rightarrow F' = \frac{B_3^2 L^2 v_{o\rho}}{R_{o\lambda}} \Rightarrow F' = 0,8N$$

Φορά ομόρροπη της ταχύτητας.

$$\mathbf{F3.} q_{\varepsilon\pi} = \frac{\Delta\Phi}{R_{o\lambda}} \Rightarrow \Delta\Phi = 1Wb$$

$$\Delta\Phi = B_3 \Delta S = B_3 L \Delta x \Rightarrow \Delta x = 1m$$

$$Q = |W_{F_L}| = |-F_L \Delta x| = 0,8J$$

$$\mathbf{F4.} R_{\varepsilon\xi} = \frac{R_1 R_2}{R_1 + R_2} = 1\Omega$$

$$R'_{o\lambda} = 4\Omega$$

$$F_L'' = \frac{B^2 L^2}{R_{o\lambda}'} v = F' \Rightarrow v'_{o\rho} = 3,2m/s$$

$$V_{K\Lambda} = E_{\varepsilon\pi} - \frac{E_{\varepsilon\pi}}{R_{o\lambda}} R_{K\Lambda} = Bv'_{o\rho} L - \frac{Bv'_{o\rho} L}{R_{o\lambda}} R_{K\Lambda} \Rightarrow V_{K\Lambda} = 0,8V$$

$$V_{K\Lambda} = V_1 = V_2 = 0,8V$$

$$I_1 \cdot 2 = 0,8 \Rightarrow I_1 = 0,4A$$

$$I_2 \cdot 2 = 0,8 \Rightarrow I_2 = 0,4A$$

Θ\u03b5\u03bc\u03b1 \u0394

$$\mathbf{\Delta 1)} \text{ \u03a3\u039c\u03b1 \u03a32: } \Sigma F = 0 \rightarrow T_2 = m_2 g \rightarrow T_2 = 30N$$

Κύλινδρος: $T_2R - T_1r = 0 \rightarrow T_1 = 60N$

Ράβδος: $\Sigma\tau(A) = 0 \rightarrow T_1\left(\frac{l}{2} + d\right)\eta\mu 45 + F_T l \eta\mu 45 = Mg \frac{l}{2} \sigma\upsilon\nu 45 \rightarrow F_T = 10N$

Δ2) Θ1(1): $\Sigma F = 0 \rightarrow m_1 g \eta\mu\varphi = kx_1 \rightarrow x_1 = 0,05m$

Θ1(1+2): $\Sigma F = 0 \rightarrow (m_1 + m_2)g \eta\mu\varphi = kx_2 \rightarrow x_2 = 0,2m$

ΑΔΕΤ: $E = K + U \rightarrow \frac{1}{2}kA^2 = \frac{1}{2}(m_1 + m_2)v_k^2 + \frac{1}{2}k(x_2 - x_1)^2 \rightarrow A = 0,3m$

Δ3) $\omega = \sqrt{\frac{k}{m_1+m_2}} = 5rad/sec$

Από στρεφόμενο διάνυσμα: $\varphi_0 = \frac{11\pi}{6} rad$

$$x(t) = 0,3\eta\mu\left(5t + \frac{11\pi}{6}\right), (SI)$$

Δ4) Από ΑΔΟ: $m_2 v_2 \sigma\upsilon\nu 60 = (m_1 + m_2)v_k \rightarrow v_2 = 2\sqrt{3} m/sec$

Από ελεύθερη πτώση: $h = \frac{1}{2}gt^2 \rightarrow h = 0,6m$

Δ5) $F_{\varepsilon\pi} = kA = 30N, F_{\varepsilon\lambda} = k(A + x_2) = 50N$

$$\frac{F_{\varepsilon\lambda}}{F_{\varepsilon\pi}} = \frac{5}{3}$$