ΠΑΝΕΛΛΗΝΙΕΣ ΕΞΕΤΑΣΕΙΣ
ΗΜΕΡΗΣΙΟΥ& ΕΣΠΕΡΙΝΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ
ΔΕΥΤΕΡΑ 22 ΙΟΥΝΙΟΥ 2020
ΕΞΕΤΑΖΟΜΕΝΟ ΜΑΘΗΜΑ:
ΦΥΣΙΚΗ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ (ΝΕΟ ΣΥΣΤΗΜΑ)

Ε Ν Δ Ε Ι Κ Τ Ι Κ Ε Σ Α Π Α Ν Τ Η Σ Ε Ι Σ Θ Ε Μ Α Τ Ω Ν

ΘΕΜΑ Α

Α1. γ

Α2. α

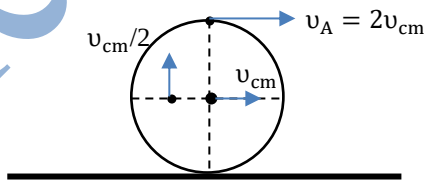
Α3. γ

Α4. δ

Α5. α – Σ
β – Λ
γ – Σ
δ – Σ
ε – Λ

ΘΕΜΑ Β

Β1. – iii



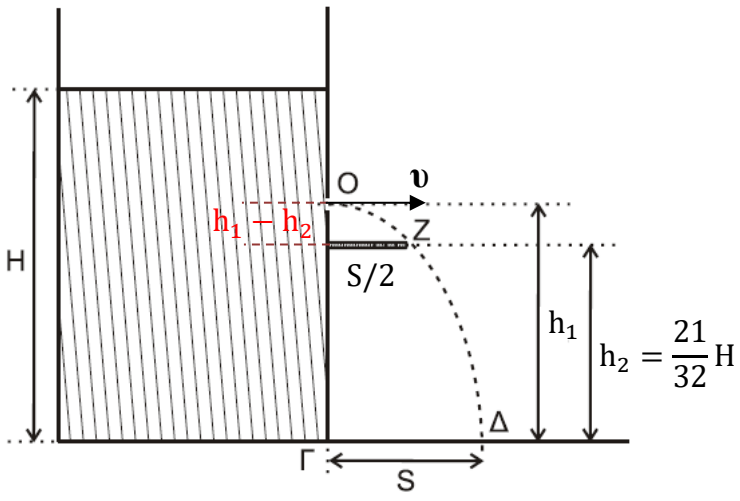
$$\frac{\upsilon_\Gamma}{\upsilon_A}=\frac{\sqrt{\upsilon_{cm}{}^2+\frac{\upsilon_{cm}{}^2}{4}}}{2\upsilon_{cm}}=\frac{\upsilon_{cm}\frac{\sqrt{5}}{2}}{2\upsilon_{cm}}=\frac{\sqrt{5}}{4}$$

Β2. – ii

$$\Pi_1=\frac{\frac{1}{2}m_2\left(\frac{2m_1\upsilon_1}{m_1+m_2}\right)^2}{\frac{1}{2}m_1\upsilon_1{}^2}=\frac{4m_1m_2}{(m_1+m_2)^2}$$

$$\Pi_2=\frac{\frac{1}{2}m_1\left(\frac{2m_2\upsilon_2}{m_1+m_2}\right)^2}{\frac{1}{2}m_2\upsilon_2{}^2}=\frac{4m_1m_2}{(m_1+m_2)^2}$$

Β3. – i



$$\left.\begin{aligned} s &= \sqrt{2g(H-h_1)}\sqrt{\frac{2h_1}{g}} \\ \frac{s}{2} &= \sqrt{2g(H-h_1)}\sqrt{\frac{2(h_1-h_2)}{g}} \end{aligned}\right\} \text{ Άρα:}$$

$$\sqrt{\frac{2h_1}{g}} = 2\sqrt{\frac{2(h_1-h_2)}{g}}$$

$$\Rightarrow \frac{2h_1}{g} = 4\frac{2(h_1-h_2)}{g}$$

$$\Rightarrow 2h_1 = 32h_1 - 4h_2$$

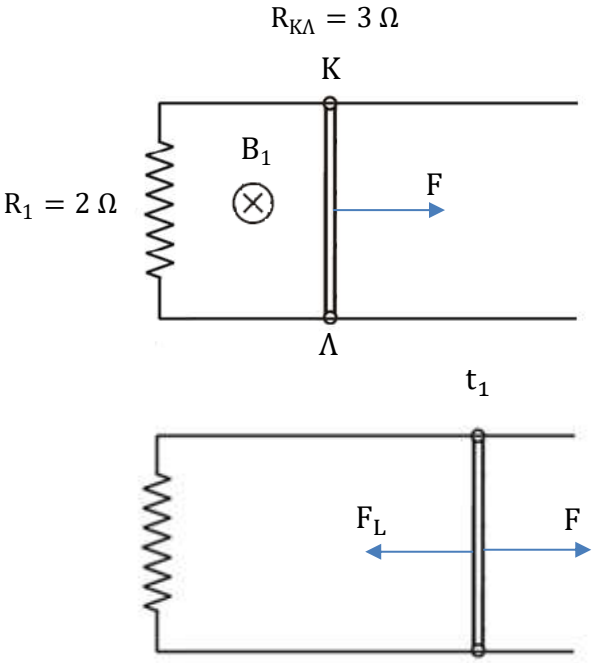
$$\Rightarrow 30h_1 = 4h_2 \quad \text{ή} \quad h_1 = \frac{4}{3}\cdot\frac{21H}{32}$$

$$\Rightarrow h_1 = \frac{7}{8}H$$

$$\Pi = A\sqrt{2g\frac{H}{8}} = \frac{A\sqrt{gH}}{2}$$

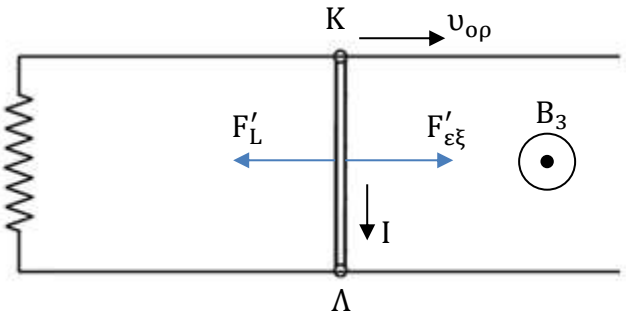
ΘΕΜΑ Γ

Γ1.



$$\Sigma F = 0 \Rightarrow F - \frac{B^2\upsilon\ell^2}{R} = 0 \Rightarrow \upsilon_{o\rho} = \frac{0{,}8\cdot 5}{1\cdot 1}\ \text{m/s} \Rightarrow \boxed{\upsilon_{o\rho} = 4\ \text{m/s}}$$

Γ2.



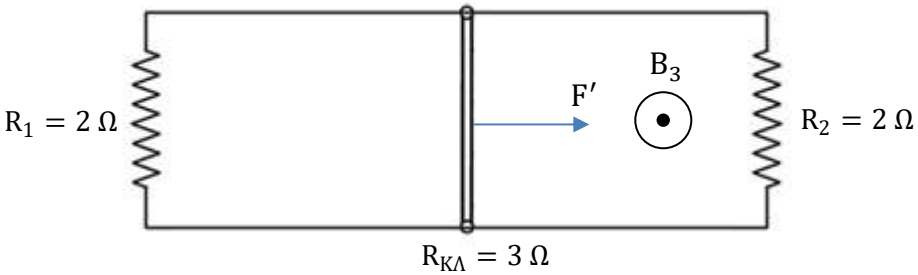
$F' = 0{,}8\ \text{N}$

Γ3. $Q = W_F = F' \cdot x$

$$q = \frac{B_3 \cdot \ell x}{R_1 + R_{K\Lambda}} \Longrightarrow x = \frac{0{,}2 \cdot 5}{1 \cdot 1}\ \text{m} = 1\ \text{m}$$

Άρα $Q = 0{,}8\ \text{N} \cdot 1\ \text{m} = 0{,}8\ \text{J}$

Γ4.



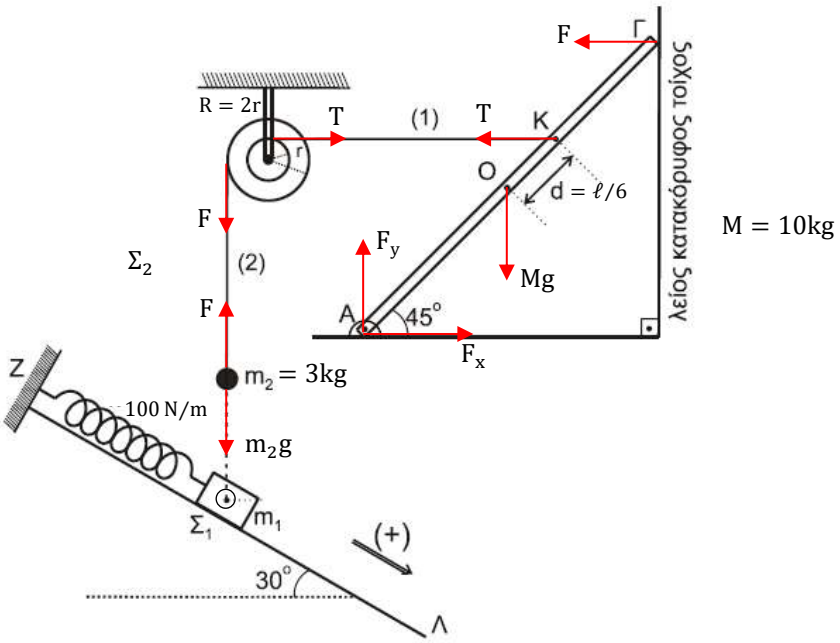
$$F' = \frac{B^2 \upsilon'_{o\rho} \ell^2}{R_{o\lambda}} \Longrightarrow \upsilon'_{o\rho} = \frac{0{,}8 \cdot 4}{1 \cdot 1} = 3{,}2\ \text{m/s}$$

$$I = \frac{B\upsilon'_{o\lambda}\ell}{R_{o\lambda}} = \frac{1 \cdot 3{,}2 \cdot 1}{4}\ \text{A} = 0{,}8\ \text{A}$$

$V_{K\Lambda} = IR_{1,2} = 0{,}8\ \text{V}$

$I_1 = I_2 = 0{,}4\ \text{A}$

ΘΕΜΑ Δ



Δ1. $F = m_2 g = 30\ N\ \ (1)$

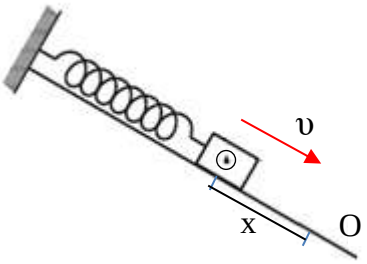
$FR - Tr = 0 \Longrightarrow T = 60\ N$

$$\Sigma\tau_A = 0 \Longrightarrow F\ell\eta\mu 45^o + T\left(\frac{\ell}{2} + d\right)\eta\mu 45^o - Mg\frac{\ell}{2}\sigma\upsilon\nu 45^o = 0$$

$$\Longrightarrow F\ell + T\left(\frac{\ell}{2} + \frac{\ell}{6}\right) = Mg\frac{\ell}{2} \quad \text{ή}$$

$$F = -\frac{2}{3}T + \frac{Mg}{2} \Longrightarrow F = 10\ N$$

Δ2.



$$x = \frac{15}{100} = \frac{3}{20}\ m$$

$$\frac{1}{2}(m_1 + m_2)\upsilon^2 + \frac{1}{2}kx^2 = \frac{1}{2}kA^2 \Longrightarrow A = \sqrt{x^2 + \frac{(m_1 + m_2)v^2}{k}}$$

$$\Rightarrow A = \sqrt{\left(\frac{3}{20}\right)^2 + \frac{4 \cdot 27}{16 \cdot 100}}\ m$$

$$\Rightarrow A = \sqrt{\frac{9}{400} + \frac{27}{400}}\ m = \frac{6}{20} = 0{,}3\ m$$

Δ3. $x = A\eta\mu(\omega t + \varphi_o)$

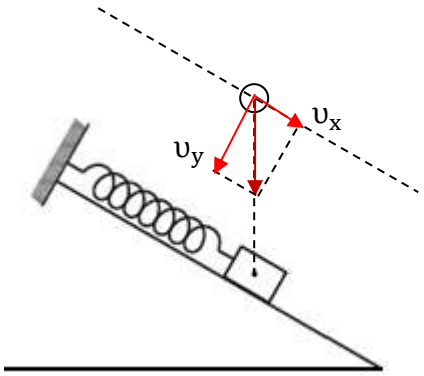
$$\omega = \sqrt{\frac{100}{4}} = 5\ rad/s$$

$$\eta\mu\varphi_o = -\frac{\frac{3}{20}}{\frac{3}{10}} = -\frac{1}{2} \Rightarrow \varphi_o = \frac{5\pi}{6} \text{ ή } \varphi_o = \frac{11\pi}{6}\ rad$$

Επειδή $\upsilon < 0 \Longrightarrow \varphi_o = \frac{5\pi}{6}$ rad,

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

Δ4.



$P_{x_\Lambda} = P_{x_K}$

$m_1\upsilon\eta\mu 30 = (m_1 + m_2)v$ ή

$3 \cdot \upsilon\frac{1}{2} = 4\frac{3\sqrt{3}}{4}$ ή

$\upsilon = 2\sqrt{3}\ m/s$

Δ5. $\frac{|F_{\varepsilon\lambda}|}{|F|} = \frac{k(\Delta\ell_1 + x + A)}{kA} = \frac{m_2 g\eta\mu\varphi + m_1 g\eta\mu\varphi + kA}{kA} = \frac{15 + 5 + 30}{30} = \frac{5}{3}$