ΑΠΑΝΤΗΣΕΙΣ ΦΥΣΙΚΗ ΚΑΤΕΥΘΥΝΣΗΣ

ΘΕΜΑ 1ο

1 → **γ**

2 → **α**

3 → **β**

4 → **γ**

5) α) → **Λ**

β) → **Λ**

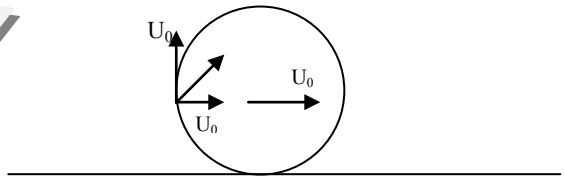
γ) → **Σ**

δ) → **Σ**

ε) → **Λ**

ΘΕΜΑ 2ο.

1. β) Σ



$$u_A = \sqrt{u_0^2 + u_0^2} = u_0\sqrt{2}$$

2. *Α.Δ.Ο*. *β) Σ*

$$m_A U_A = (m_A + m_B)U_B \Leftrightarrow m_A U_A = 3m_A U_B \Leftrightarrow U_B = \frac{U_A}{3}$$

$$\Delta K = K_{τελ} - K_{αρχ} = \frac{1}{2}3m_A\frac{U_A^2}{9} - \frac{1}{2}m_A U_A^2 = \frac{3m_A U_A^2 - 9m_A U_A^2}{18} =$$

$$= \frac{-6m_A U_A^2}{18} = -\frac{m_A U_A^2}{18} = -\frac{m_A U_A^2}{3}$$

3. γ) Σ

E = U + K $\Rightarrow$

$$\frac{1}{2}m\omega^2 \mathrm{A}^2 = \frac{1}{2}m\omega^2 x^2 + \frac{1}{2}mU^2 \Leftrightarrow$$

$$U^2 = \omega^2(\mathrm{A}^2 - x^2) \Leftrightarrow U^2 = \omega^2 A^2 - \omega^2 x^2 \Leftrightarrow$$

$$U^2 = U_0^2 - \omega^2 x^2 \Leftrightarrow \omega^2 x^2 = U_0^2 - U^2 \quad (1)$$

$$\alpha = \omega^2 x \Leftrightarrow a^2 = \omega^4 x^2 \Leftrightarrow x^2 = \frac{a^2}{\omega^4} \quad (2)$$

(1), (2)α⇔ ^{2} =(ω^2 U_0^2 –)U^2

<u>ΘΕΜΑ 3ο.</u>

$$y = 0,4\eta\mu 2\pi(2t - 0,5x)$$

α) $A = 0,4m$ f=2Hz, T=0,5secλ = 2m, ω = 2πf=4πrad/s

$$\mathrm{U}=\lambda \cdot f = 4m/s$$

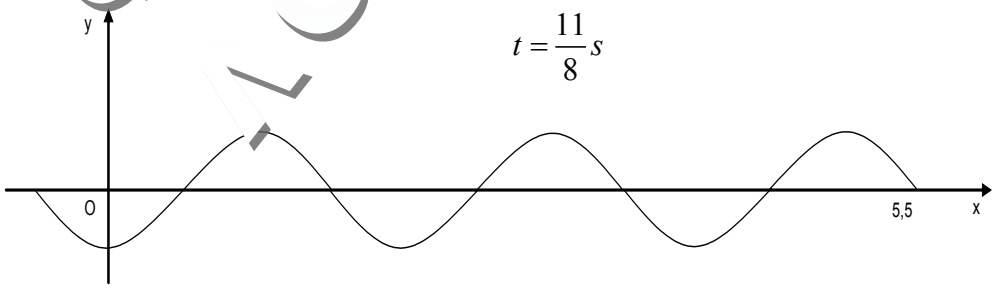
β) $U_{\max} = \omega \mathrm{A} = 1,6\pi m/s$

γ) $\Delta\Phi = 2\pi\frac{\Delta \mathrm{X}}{\lambda} = 2\pi\frac{1,5}{2} = 1,5\pi rad$

δ) $t_1 = \frac{11}{8}s$ y=0,4ημ2π$(2\frac{11}{8} - \frac{x}{2}) =$

$$0,4\eta\mu(\frac{11}{2}\pi - x\pi) \quad (1)$$

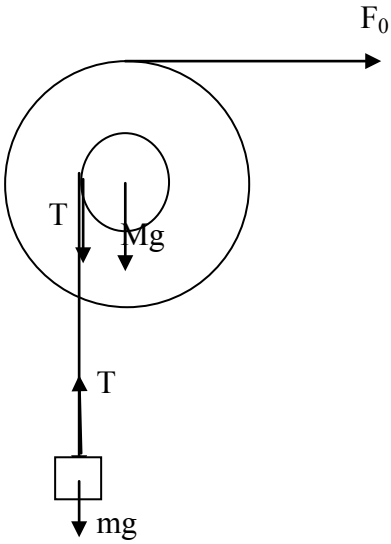
Σε χρόνο $t = \frac{11}{8}s$ το κύμα έχει φτάσει σε απόσταση $x = ut = 4\frac{11}{8} = \frac{11}{2}m$



Για $x = 0 \overset{(1)}{\Rightarrow} y = 0,4\eta\mu\frac{11}{2}\pi = 0,4\eta\mu(10\pi + \frac{3\pi}{2}) = -0,4m$

ΘΕΜΑ 4ο

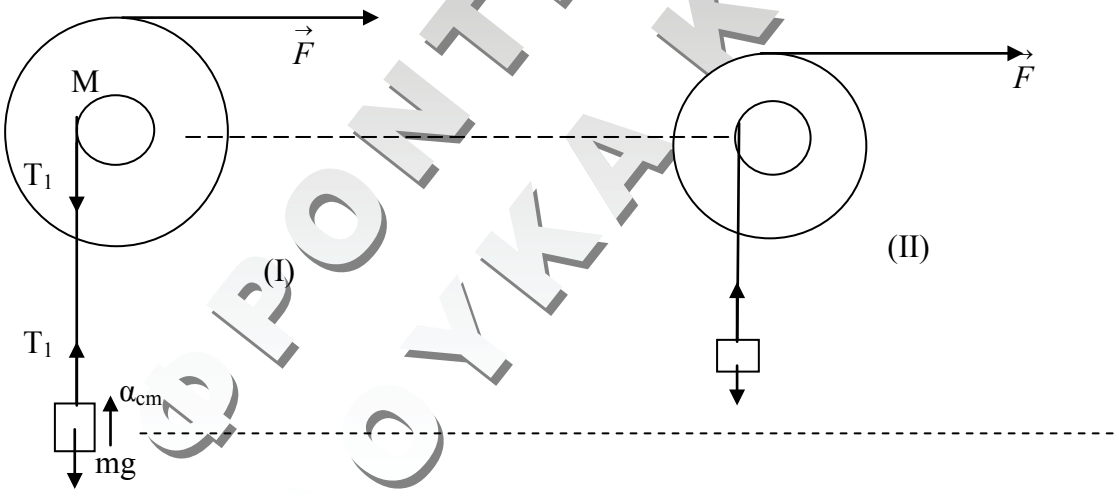
α.



Το m ισορροπεί $\Sigma F = 0 \Leftrightarrow T = mg = 200N$

Το π ισορροπεί $\Sigma \tau^{(0)} = 0 \Leftrightarrow F_0 \cdot 2R - TR = 0 \Leftrightarrow F_0 = \frac{T}{2} = 100N$

β.



Κίνηση m $\Sigma F = ma_{cm} \Leftrightarrow T_1 - mg = ma_{cm}$ (1)

Κίνηση π $\Sigma \tau^{(0)} = I\alpha_\gamma \Leftrightarrow F2R - T_1R = MR^2 \frac{a_{cm}}{R} \Leftrightarrow 2F - T_1 = Ma_{cm}$ (2)

(1), (2) $\Rightarrow a_{cm} = 1m/s^2$

γ) $h = \frac{1}{2} a_{cm} t^2 \Leftrightarrow t = 2\,\text{sec}$

$$u = a_{cm} t = 2m/s$$

$$\omega = \frac{u}{R} = 10 rad/s$$

$$L = I\omega = \mathrm{M}R^2\omega = 4kg\ \mathrm{m}^2/s$$

δ) Θ.Μ.ΚΕ. (Ι) →(ΙΙ) :

$$\frac{1}{2} I\omega^2 + \frac{1}{2} mu^2 = W_F + W_B \Leftrightarrow$$

$$\frac{1}{2} MR^2\omega^2 + \frac{1}{2} mu^2 = F \cdot x - mgh \Leftrightarrow$$

$$x = 4m$$

ε) $$\frac{K_\pi}{W_F} 100\% = \frac{\frac{1}{2} I\omega^2}{\frac{1}{2}\mathrm{I}\omega^2 + \frac{1}{2} mu^2 + mg} 100\% = 4,3\%$$