

Ass. 5.219.

$$l = 1,6 \text{ m}$$

$$R^* = 0,4 \Omega/\text{m}$$

$$\alpha = 1 \text{ m}$$

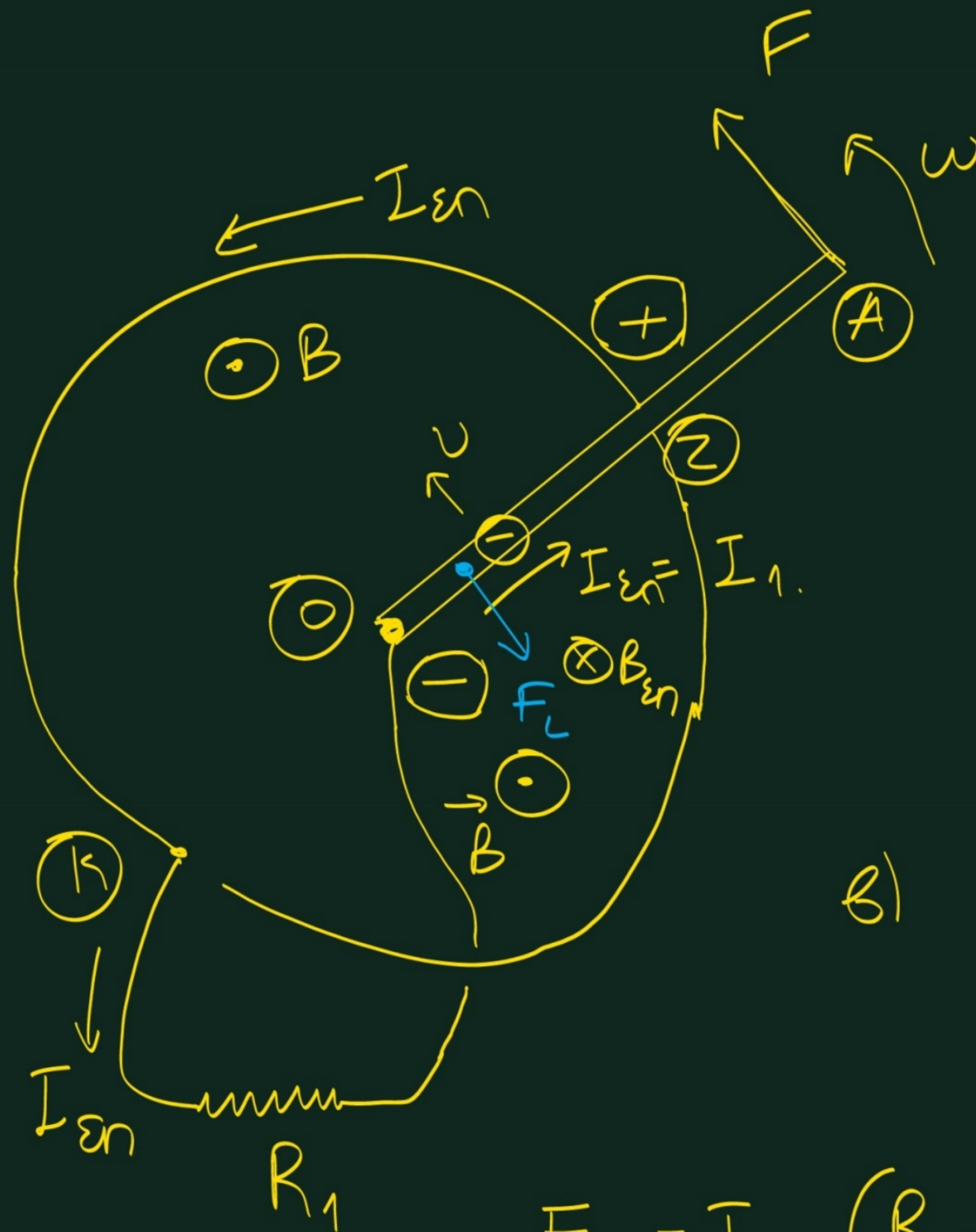
$$R_1 = 0,1 \Omega$$

$$OZ = \alpha$$

$$OA = l$$

$$V_1 = 0,2 \text{ Volt}$$

$$B = 2 \text{ T}$$



$$a) V_1 = I_1 \cdot R_1 \Rightarrow$$

$$0,2 = I_1 \cdot 0,1 \Rightarrow I_1 = 2 \text{ A.}$$

$$F_L = B \cdot OZ \cdot I_1 \Rightarrow$$

$$F_L = B \alpha \cdot I_1 \Rightarrow$$

$$F_L = 2 \cdot 1 \cdot 2 \Rightarrow F_L = 4 \text{ N}$$

$$I_{en} = I_1 = 2 \text{ A.}$$

$$b) R_{OZ} = R^* \cdot OZ = 0,4 \cdot 1 = 0,4 \Omega$$

$$R_1 = 0,1 \Omega$$

$$E_{en} = I_{en} (R_{OZ} + R_1) \Rightarrow E_{en} = 2 \cdot (0,4 + 0,1) \Rightarrow$$
$$E_{en} = 1 \text{ Volt}$$

$$E_{\text{en}} = \frac{1}{2} B \omega \cdot \omega^2 = \frac{1}{2} B \omega^3 \Rightarrow$$

$$1 = \frac{1}{2} \cdot 2 \cdot \omega \cdot 1 \Rightarrow \omega = 1 \text{ rad/sec.}$$

$$\delta) Q_{R_{02}} = I_{\text{en}}^2 (R_1 + R_{02}) \cdot 10T =$$

$$= I_{\text{en}}^2 \cdot (R_1 + R_{02}) \cdot 10 \cdot \frac{2\pi}{\omega} \Rightarrow$$

$$= 2^2 \cdot 0,5 \cdot 10 \cdot \frac{2\pi}{1} =$$

$$= 20 \cdot 2\pi \Rightarrow Q_{R_{02}} = 40\pi \text{ Joule}$$

$$\delta) W_F = Q_{R_{02}} \left(\begin{array}{l} \text{σε για περιβροχή} \\ \text{από διατήρηση ενέργειας} \end{array} \right)$$

$$\text{Αρα: } F \cdot 2\pi l = I_{\text{en}}^2 (R_1 + R_{02}) \cdot T \Rightarrow$$

$$F \cdot 2\pi \cdot 1,6 = 4 \cdot 0,5 \cdot \frac{2\pi}{1} \Rightarrow$$

$$F = \frac{2\pi \cdot 2}{2\pi \cdot 1,6} \Rightarrow$$

$$F = \frac{2}{1,6} \Rightarrow F = \frac{5}{4} \Rightarrow$$

$$F = 1,25 \text{ N}$$

$$Q = I_{\text{eff}}^2 R_1 t_1 =$$

$$Q = \frac{1}{2} I^2 R_1 t_1 =$$

$$Q = \frac{1}{2} \cdot 9 \cdot 12 \cdot 1,9 =$$

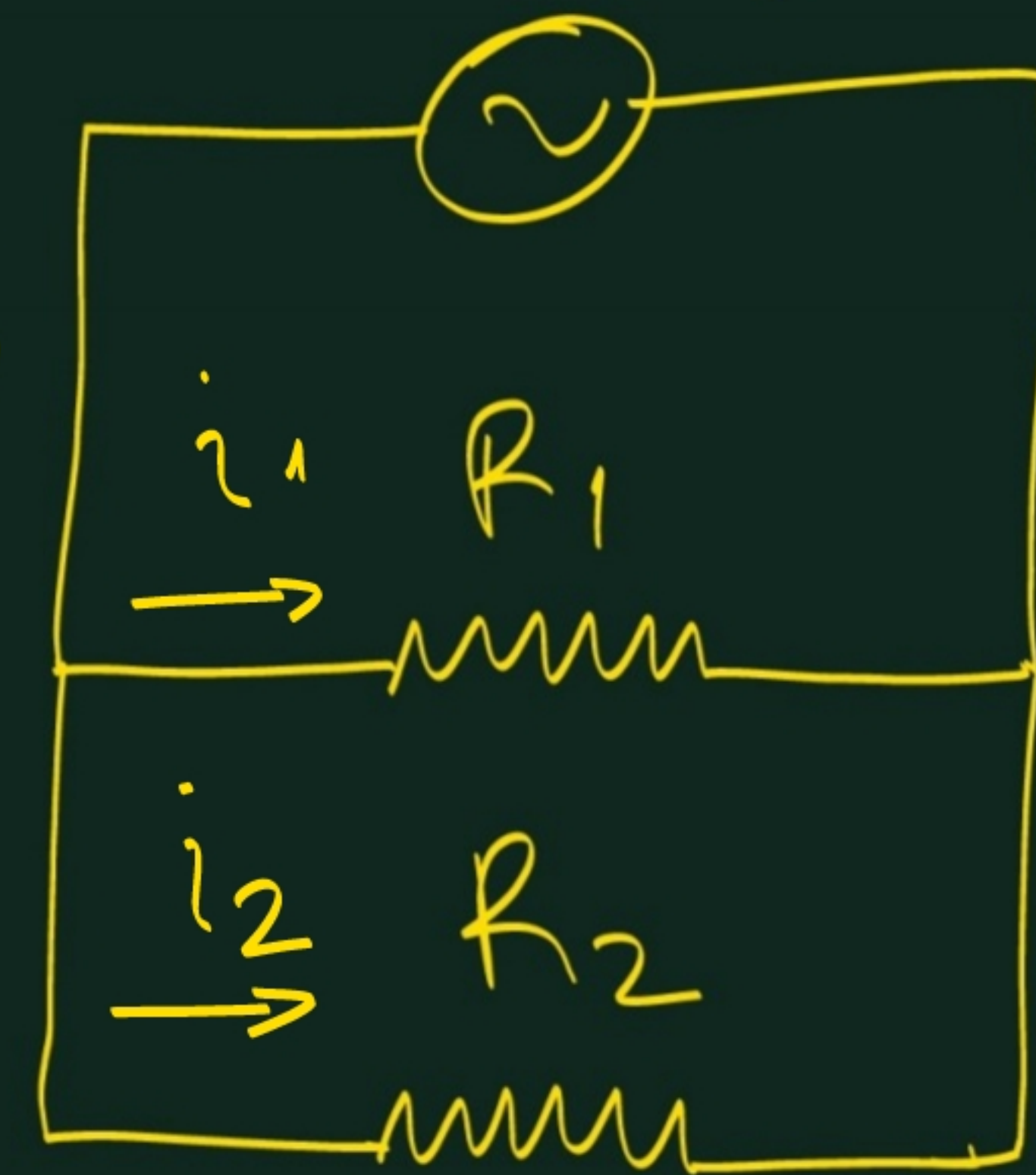
$$Q = 54 \cdot 1,9 =$$

$$= 54 \cdot 2 - 54 \cdot 0,1$$

$$= 108 - 5,4 = 102,6 \text{ Joule}$$

8) i)

i ↓



$$R_1 = 12 \Omega$$

$$R_2 = 4 \Omega$$

$$V = 36 \sin(5\pi t)$$

$$i_1 = \frac{V}{R_1} = 3 \sin(5\pi t)$$

$$\text{Apr: } I_1 = 3 \text{ A}$$

$$I_{\text{eff},1} = \frac{I_1}{\sqrt{2}} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2} \text{ A}$$

$$\text{ii) } i_2 = \frac{V}{R_2}$$

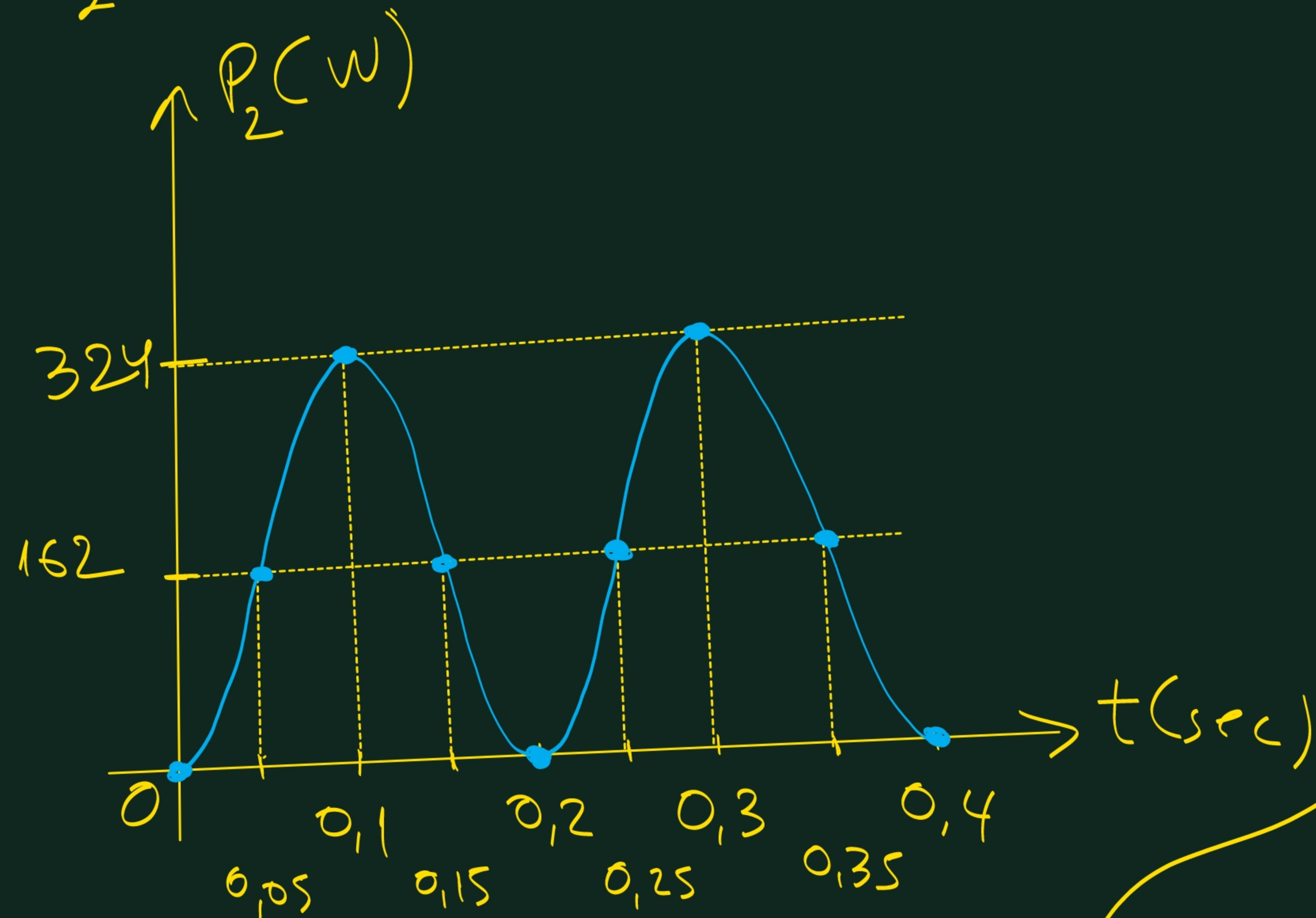
$$P_2 = i_2^2 R_2 = \frac{V^2}{R_2} = \frac{36^2}{4} \sin^2(5\pi t) = 324 \sin^2(5\pi t)$$

$$T = \frac{2\pi}{\omega} = \frac{2\pi}{5\pi} = 0,4 \text{ sec}$$

$$P_2(t) = 324 \sin^2(5\pi t) \text{ (SI)}$$

$$T = 0,4 \text{ sec}$$

$$\text{ii) } R_{02} = \frac{R_1 R_2}{R_1 + R_2} = \frac{12 \cdot 4}{12 + 4} = \frac{12 \cdot 4}{16} = \underline{\underline{3 \Omega}}$$



$$i = i_1 + i_2 = \left(\frac{V}{R_1} + \frac{V}{R_2} \right)$$

$$= \frac{V}{R_{02}} = \frac{V}{R_{02}} \sin(\omega t) =$$

$$i = \frac{36}{3} \sin(5\pi t) = 12 \sin(5\pi t) \text{ (SI)}$$

$$A_{\text{eff}}: I = 12 \text{ A} \quad I_{\text{eff}} = \frac{I}{\sqrt{2}} = \frac{12}{\sqrt{2}} = 6\sqrt{2} \text{ A}$$

$$\bar{P} = I^2 \cdot R_{02} = (6\sqrt{2})^2 \cdot 3 = 36 \cdot 6 = 216 \text{ Watt}$$

Αδ. 5.66 6ελ. 229.

$$l = 0,5 \text{ m}$$

$$L = 25 \cdot 10^{-3} \text{ Henry}$$

$$m = 150 \text{ g} = 0,15 \text{ kg}$$

$$R = 5 \cdot 10^{-2} \Omega$$

$$B = 0,1 \text{ T}$$

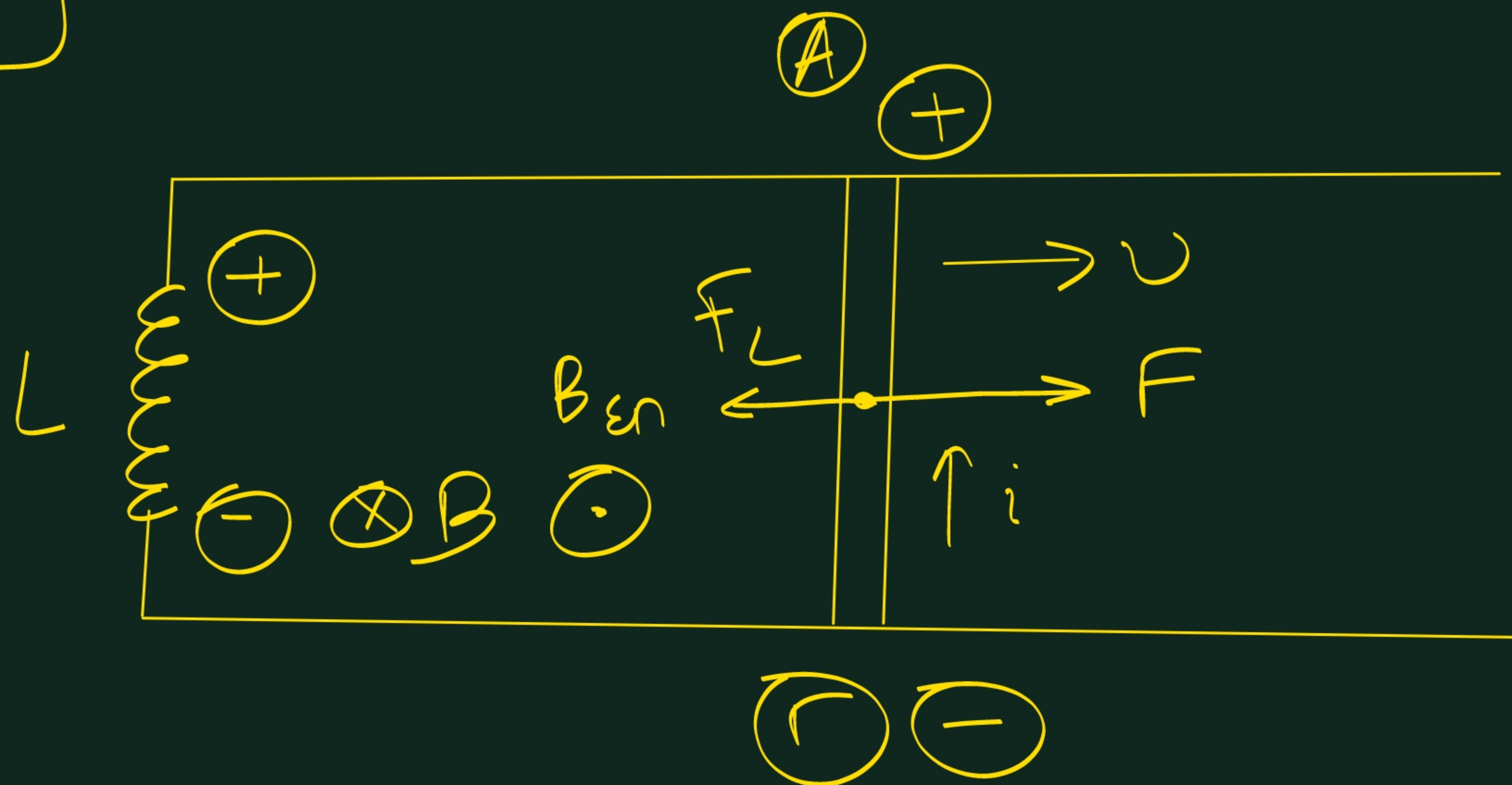
$$i = 2t + 3 \text{ (SI)}$$

α) Κατ' ανάλυση την έχουμε:

$$|E_{\text{αυτ}}| = L \frac{|\Delta i|}{\Delta t} = L \frac{|i(t) - i(0)|}{t - 0} = 25 \cdot 10^{-3} \frac{(2t + 3 - (2 \cdot 0 + 3))}{t}$$

$$= 25 \cdot 10^{-3} \cdot 2 = 50 \cdot 10^{-3} = 5 \cdot 10^{-2} \text{ Volt}$$

Άρα: $|E_{\text{αυτ}}| = 0,05 \text{ Volt}$ γε την ποσότητα που φάινεται στο σχήμα



β) Ισοδύναμο κύκλωμα.

