Άσκ. 5.219.

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

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

$\alpha = 1\,m$

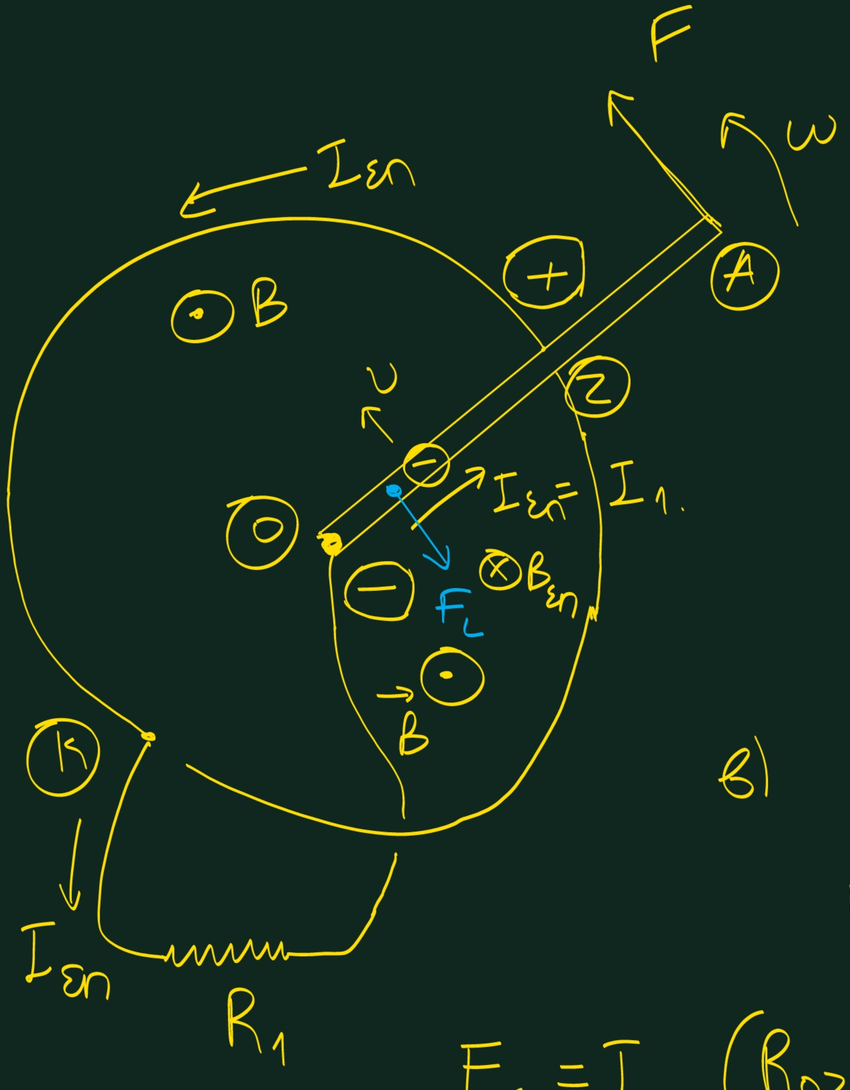
$R_1 = 0{,}1\,\Omega$

$OZ = \alpha$

$OA = l$

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

$B = 2\,T$



α) $V_1 = I_1 \cdot R_1 \Rightarrow$

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

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

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

$F_L = 2 \cdot 1 \cdot 2 \Rightarrow F_L = 4\,N$

$I_{επ} = I_1 = 2\,A.$

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

$R_1 = 0{,}1\,\Omega$

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

$E_{επ} = 1\,Volt$

$$E_{επ} = \frac{1}{2} B w \cdot oz^2 = \frac{1}{2} B w a^2 \Rightarrow$$

$$1 = \frac{1}{2} \cdot 2 \cdot w \cdot 1 \Rightarrow w = 1 \, rad/sec.$$

γ) $$Q_{R_{o1}} = I_{επ}^2 (R_1 + R_{o2}) \cdot 10T =$$

$$= I_{επ}^2 \cdot (R_1 + R_{o2}) \cdot 10 \cdot \frac{2π}{w} \Rightarrow$$

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

$$= 20 \cdot 2π \Rightarrow Q_{R_{o1}} = 40π \, Joule$$

δ) $W_F = Q_{R_{o1}}$ ← σε μία περιστροφή. (από διατήρηση ενέργειας)

Άρα: $$F \cdot 2πl = I_{επ}^2 (R_1 + R_{o2}) \cdot T \Rightarrow$$

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

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

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

$$F = 1,25 N$$

Ασκ. 6.99

α) $P = vi \Rightarrow P = i^2 R_1 \Rightarrow$

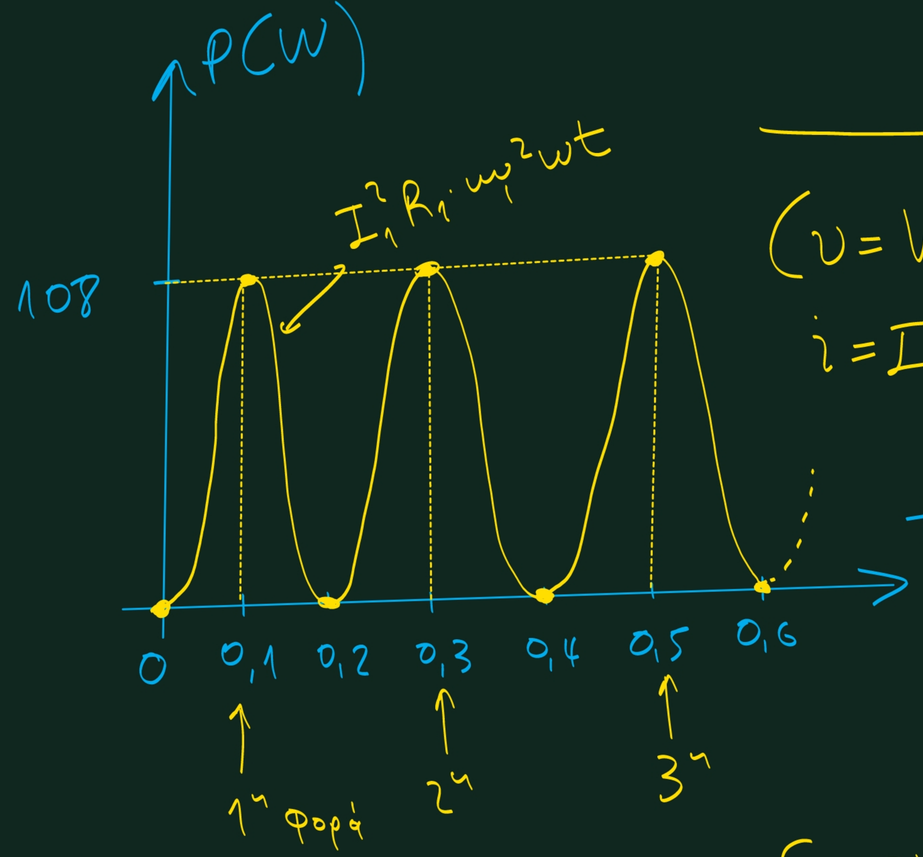
$P = I^2 R_1 \cdot \eta\mu^2 \omega t$

Αφού: $P_{max} = I^2 R_1 \Rightarrow$

$108 = I^2 \cdot 12 \Rightarrow$

$I^2 = 9 \Rightarrow I = 3A.$

$V = I \cdot R_1 = 3 \cdot 12 = 36 Volt$



$(v = V \eta\mu \omega t$

$i = I \eta\mu \omega t)$

$T = 0,4 sec \Rightarrow$

$\frac{2\pi}{\omega} = 0,4 \Rightarrow \omega = \frac{2\pi}{0,4} \Rightarrow$

$\omega = 5\pi \ rad/sec$

Συνεπώς: $i = I \cdot \eta\mu\omega t \Rightarrow i = 3\eta\mu(5\pi t)$ (SI)

και $v = V \cdot \eta\mu\omega t \Rightarrow v = 36\eta\mu(5\pi t)$ (SI)

β) Για 3η φορά: $t_1 = 0,1 + (3-1) \cdot 0,2$

$t_1 = 0,1 + 9 \cdot 0,2 =$

$= 0,1 + (10-1) \cdot 0,2 = 0,1 + 1,8 = 1,9 sec$

$Q = I_{ef}^2 R_1 \cdot t_1 =$

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

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

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

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

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

γ) i)