ثا / الاندلس / حل ورقة عمل مادة الفيزياء / ١

التمرين الأول ①

$u = 200\sqrt{2}\cos 100\pi t$

$U_{eff} = \frac{200\sqrt{2}}{\sqrt{2}} = 200\ V$

① معاذير الفرع 1

$Z_1 = \sqrt{R^2 + X_c^2}$

$X_c = \frac{1}{\omega C} = \frac{1}{100\pi \frac{1}{4000\pi}}$

$X_c = 40\ \Omega$

$Z_1 = \sqrt{(40)^2 + (40)^2} = 40\sqrt{2}\ \Omega$

معاذير الفرع 2

$Z_2 = \sqrt{R'^2 + X_L^2}$

$\cos\varphi_2 = \frac{R'}{Z_2}$ / $\cos\varphi_2 = \frac{1}{\sqrt{2}}$

$\frac{1}{\sqrt{2}} = \frac{40}{Z_2}$

$Z_2 = 40\sqrt{2}\ \Omega$

② I_{eff} للفرع وتابعاته

$I_{eff_1} = \frac{U_{eff}}{Z_1} = \frac{200}{40\sqrt{2}} = \frac{5}{\sqrt{2}}\ A$

$I_{eff_2} = \frac{U_{eff_2}}{Z_2} = \frac{200}{40\sqrt{2}} = \frac{5}{\sqrt{2}}$

$i = I_{max_1}\cos(100\pi t + \varphi_1)$

فرع 1

$\cos\varphi_1 = \frac{R}{Z_1} = \frac{40}{40\sqrt{2}} = \frac{1}{\sqrt{2}}$

$\varphi_1 = \frac{\pi}{4}$

$i_1 = \frac{5}{\sqrt{2}}\sqrt{2}\cos(100\pi t + \frac{\pi}{4})$

$i_2 = \frac{5}{\sqrt{2}}\sqrt{2}\cos(100\pi t - \frac{\pi}{4})$

③

$P_{av_1} = R I_{eff_1}^2$

$= 40\left(\frac{5}{\sqrt{2}}\right)^2$

$= 500$ واط حراري

$P_{av_2} = R' I_{eff_2}^2$

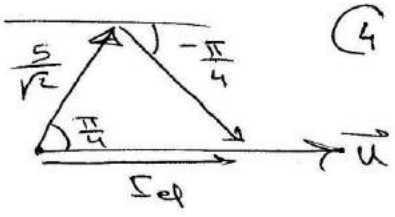
$= 40\left(\frac{5}{\sqrt{2}}\right)^2$

$= 500$ واط حراري

$P_{av} = 500 + 500$

$= 1000$ واط

④



$I_{eff}^2 = \left(\frac{5}{\sqrt{2}}\right)^2 + \left(\frac{5}{\sqrt{2}}\right)^2$

$= 25$

$I_{eff} = 5\ A$

⑤ تبقى الشدة الكلية نفسها

$U_{eff} = Z\ I_{eff}$

ثابت — لم تتغير

لم تتغير

$Z = Z$

بعد إضافة الـ C — قبل إضافة الـ C

$\sqrt{R'^2 + X_L^2} = \sqrt{R'^2 + (X_L - X_C)^2}$

$X_L^2 = (X_L - X_C)^2$

$X_L = X_L - X_C$

$X_C = 0$

$\frac{1}{\omega C} = 0$ مرفوض $C \to \infty$

$X_L = -(X_L - X_C)$

$X_C = 2X_L$

حساب X_L:

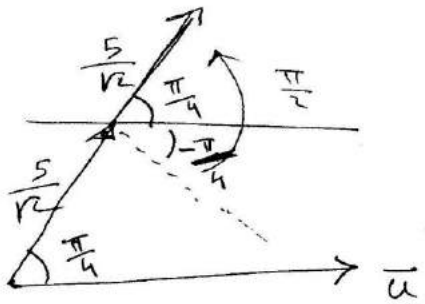
$Z_1 = \sqrt{R'^2 + X_L^2}$

$(40\sqrt{2})^2 = (40)^2 + X_L^2$

$X_C = 40$

$X_C = 2 \cdot 40 = 80\ \Omega$

$C = \frac{1}{8000\pi}\ F$



$X_C > X_L$

التوتر فرق الطور متقدم في هذا الفرع

$I_{eff} = \frac{5}{\sqrt{2}} + \frac{5}{\sqrt{2}}$ كلي

$= \frac{10}{\sqrt{2}}\ A$

$= 5\sqrt{2}\ A$

ثا/ الأندلس / مادة الفيزياء 3ع / (2)

المسألة (2)

(1) $\varphi = 0$

يتفق u و i الدارة في حالة تجاوب كهربائي

$U_{eff} = \frac{200\sqrt{2}}{\sqrt{2}} = 200\ V$

$I_{eff} = \frac{5\sqrt{2}}{\sqrt{2}} = 5\ A$

$Z = \frac{200}{5} = 40\ \Omega$

$Z = R = 40\ \Omega$

$X_L = X_C$ ، $X_L = \frac{100\pi}{\pi}$

$\frac{1}{\pi} \cdot 100\pi = X_C$

$C = \frac{1}{10000\pi}\ F$

(2) $P_{av} = R I_{eff}^2$

$= 40(5)^2$

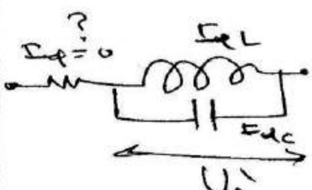
$= 1000$ واط حرارية

(3) $U_{eff_L} = X_L I_{eff}$

$= 100 \cdot 5 = 500\ V$

$u = 500\sqrt{2}\cos(100\pi t + \frac{\pi}{2})$

(4)

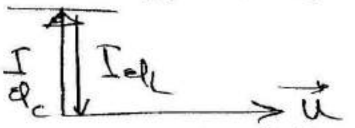


$I_{eff_L} = \frac{U'_{eff}}{X_L}$

$I_{eff_C} = \frac{U'_{eff}}{X_C}$

$X_L = X_C$

$I_{eff_L} = I_{eff_C}$



$\vec{I}_{eff} = \vec{I}_{eff_C} + \vec{I}_{eff_L}$

$I_{eff} = I_{eff_C} - I_{eff_L}$

كلي

$= 0$

حالة اختناق التيار

(خنق التيار)

المسألة (3)

(1) $Q' = S_1 v_1 = S_2 v_2$

$\pi r_1^2 v_1 = \pi r_2^2 v_2$

$(5\times10^{-2})^2\, 4 = (10\times10^{-2})^2\, v_2$

$v_2 = 1\ m s^{-1}$

$Q' = S_1 v_1$

$= \pi \cdot 25\times10^{-4} \cdot 4$

$= \pi\times10^{-2}\ m^3 s^{-1}$

$Q'_m = \rho Q'$

$= 10^3 \cdot \pi\times10^{-2}$

$= 10\pi\ kg\, s^{-1}$

(2)

$P_1 + \frac{1}{2}\rho v_1^2 + \rho g z_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g z_2$

$z_2 - z_1 = h$

$P_1 - P_2 = -\frac{1}{2}\rho v_1^2 + \frac{1}{2}\rho v_2^2 + \rho g (z_2 - z_1)$

$= 10^3(-8 + \frac{1}{2} + 5)$

$= -2500\ Pa$

(3) $W = (P_1 - P_2)\Delta V$

$\frac{W}{\Delta V} = P_1 - P_2$

$\frac{W}{100\times10^{-3}} = -2500$

$W = -250\ J$

(4) $v_1 = v_2 = 0$ توقف السائل

$P_1 - P_2 = \rho g (z_2 - z_1)$

$= 10^3 \cdot 10 \cdot \frac{1}{2}$

$= 5000\ Pa$

نادي الأندلس / حل ورقة العمل / (3)

(1) $\mu = \frac{m}{\ell} = \frac{10^{-2}}{1} = 10^{-2}\ Kg\,m^{-1}$

$v = \sqrt{\frac{4}{10^{-2}}} = 20\ ms^{-1}$

$v = \lambda f$

$\lambda = \frac{20}{50} = 0,4\ m$

(2) عدد الأطوال الموجية $= \frac{\ell}{\lambda} = \frac{1}{0,4} = 2,5$

(3) $y_{max/n} = 2y_{max/\text{نقطة}} \left|Sin\left|\frac{2\pi}{\lambda}x\right|\right|$

$= 2 \cdot 1 \times 10^{-2} Sin\left|\frac{2\pi}{0,4}(0,1-0,8)\right|$

$= 0\ (m)$ النقطة ساكنة

(4) $\mu = \rho_{\text{الوتر}} S$

$\rho = \frac{10^{-2}}{10^{-5}} = 1000\ Kg\,m^{-3}$

(5) $v = \omega\, y_{max/A}$

$= 2\pi f\ y_{max/A}$ و $y_{max/A} = 2y_{max/\text{نقطة}} = 2\ Cm$

$= 2\pi\, 50 \cdot 2 \times 10^{-2}$

$= 2\pi\ ms^{-1}$

(6) $K = 1 \quad F_T = ?$ الوتر الرابع

$f = \frac{K}{2\ell}\sqrt{\frac{F_T}{\mu}}$

$50 = \frac{1}{2 \times 1}\sqrt{\frac{F_T}{10^{-2}}}$

$F_T = 100\ N$

2i

$K\sqrt{F_T} = K'\sqrt{F_T'}$

$5\sqrt{4} = 1\sqrt{F_T'}$

$F_T' = 100\ N$