TEORIA DE CIRCUITOS 2023

Exemplos de corrente alternada

1. Transformar:
   a) $i = 1{,}414\ sen(\omega t + 15)\ A$ complexa

$a)\ \bar{I}_m = 1{,}414\angle 15^\circ\ A$

$\bar{I} = 1\angle 15^\circ\ A$

   b) $\bar{U} = 44.\sqrt{2} < -45\ V$ instantânea

$u = 88\sin\left(\omega t - 45^\circ\right)V$

2. $i_1 = 7{,}07\ sen(\omega t + 15)\ A\ ;\ i_2 = 10{,}12\ sen(\omega t + 45)\ A$

Calcular $i = i_1 + i_2 =$

$\bar{I}_{1m} = 7{,}07\angle 15^\circ A = \left(7{,}07\cos 15 + j7{,}07 sen 15\right) = \left(6{,}82 + j1{,}82\right)A;$

$\bar{I}_{2m} = 10{,}12\angle 45^\circ A = 10{,}12\cos 45 + j10{,}12 sen 45 = \left(7{,}15 + j7{,}15\right)A$

$\bar{I}_m = \left(13{,}97 + j8{,}97\right) = 16{,}60\angle 32{,}7^\circ A$

$i = 16{,}60 sen\left(\omega t + 32{,}7^\circ\right)A$

3. $u = 127\ sen(\omega t + 15)\ V; i = 12{,}15\ sen(\omega t - 15)A$

Calcular $\bar{Z} =$

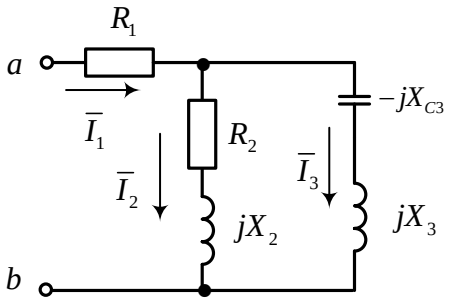
$\bar{Z} = \dfrac{\bar{U}}{\bar{I}} = 10{,}45\angle 30\Omega = \left(9{,}04 + j5{,}22\right)\Omega$

$\bar{U} = 89{,}8\angle 15\,V;\ \bar{I} = 8{,}59\angle -15\ A$

4. Calcular a impedância equivalente e as correntes do circuito abaixo.

$R_1 = 2\Omega\,, R_2 = 3\Omega\,; L_2 = 12,732\ mH\,, L_3 = 9,549\ mH$

$f = 50\ Hz; C_3 = 127\ \mu F; u_{ab} = 12\,sen\left(\omega t + 35^\circ\right), V$



$X_2 = \omega L_2 = 2\pi f\, L_2 = 4\,\Omega$

$X_3 = \omega L_3 = 2\pi f\, L_3 = 3\,\Omega$

$X_{C3} = \dfrac{1}{\omega C_3} = \dfrac{1}{2\pi f\, C_3} = 25,06\,\Omega$

$\bar{Z}_{EQ} = R_1 + \dfrac{\left(R_2 + jX_2\right) j\left(X_3 - X_{C3}\right)}{R_2 + j\left(X_3 + X_2 - X_{C3}\right)} = 7,6\angle 33,22^\circ\Omega$

$\bar{U}_{ab} = 8,49\angle 35^\circ V$

$\bar{I}_1 = \dfrac{\bar{U}_{ab}}{\bar{Z}_{EQ}} = 1,12\angle 1,78^\circ A; \bar{I}_3 = \bar{I}_1 \dfrac{R_2 + jX_2}{R_2 + j\left(X_2 + X_3 - X_{C3}\right)} = 0,31\angle 135,5^\circ A$

$\bar{I}_2 = \bar{I}_1 - \bar{I}_3 = 1,35\angle -7,75^\circ\ A$

$\bar{S}_{FOR} = \bar{U}_{ab}\ \bar{I}_1^* = 8,49\angle 35 * 1,12\angle -1,78 = \left(7,95 + j5,21\right) VA$

$P_{CONS} = I_1^2 R_1 + I_2^2 R_2 = \left(1,12\right)^2 . 2 + \left(1,35\right)^2 .3 = 7,97\ W$

$Q_{CONS} = I_3^2\left(X_3 - X_{C3}\right) + I_2^2 X_2 = \left(0,31\right)^2\left(3 - 25,06\right) + \left(1,35\right)^2 . 4 = 5,17\ VAR$