HOJA N°

FECHA

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Números complejos

EJERCICIO 1

①

a- $\sqrt{2}.e^{j45°}$

b- $10.e^{j90°}$

c- $10.e^{j180°}$

e- $6,4.e^{j(-38,6°)}$

f- $39.e^{j(-63,43°)}$

d- $22,36.e^{j26,56°}$

$\bar{a}=\sqrt{1^2+1^2}$ $\quad \alpha\bar{a}=\tan^{-1}\left(\frac{1}{1}\right)$ $\lvert\bar{a}\rvert=\sqrt{2}$ $\quad \alpha\bar{a}=45°$	$\bar{b}=\sqrt{10^2+0^2}$ $\quad \alpha b=\tan^{-1}\left(\frac{0}{10}\right)$ $\lvert\bar{b}\rvert=10$ $\quad \alpha b=0$	$\lvert\bar{c}\rvert=\sqrt{0^2+-10^2}$ $\quad \alpha c=\tan^{-1}\left(\frac{-10}{0}\right)$ $\lvert\bar{c}\rvert=10$ $\quad \alpha c=X$
$\lvert\bar{d}\rvert=\sqrt{(-20)^2+(-10)^2}$ $\quad \alpha d=\tan^{-1}\left(\frac{-10}{-20}\right)$ $\lvert\bar{d}\rvert=22,36$ $\quad \alpha d=26,56°$	$\lvert\bar{e}\rvert=\sqrt{(-5)^2+4^2}$ $\quad \alpha e=\tan^{-1}\left(\frac{4}{-5}\right)$ $\lvert\bar{e}\rvert=6,4$ $\quad \alpha e=-38,6°$	$\lvert\bar{f}\rvert=\sqrt{3^2+(-6)^2}$ $\quad \alpha f=\tan^{-1}\left(\frac{-6}{3}\right)$ $\lvert\bar{f}\rvert=39$ $\quad \alpha F=-63,43°$

②

a- $\bar{a}=2,81+j1,026$

b- $\bar{b}=0+j5$

c- $\bar{c}=-2+j0$

d- $\bar{d}=0-j6$

e- $\bar{e}=8+j0$

f- $\bar{f}=-2,828+j2,828$

g- $\bar{g}=1,41+1,41$

$\bar{a}=3.(\cos 20°)+j.3(\text{sen}20°)$
$\bar{a}=2,81+j1,026$

$\bar{b}=5.(\cos 90°)+j5.(\text{sen}90°)$
$\bar{b}=0+j5$

$\bar{c}=2.(\cos 180°)+j2.(\text{sen}180°)$
$\bar{c}=-2+j0$

$\bar{d}=6.(\cos 270°)+j6(\text{sen}270°)$
$\bar{a}=-0-j6$

$\bar{e}=8.(\cos 360°)+j8(\text{sen}360°)$
$\bar{e}=8+j0$

$\bar{f}=4.(\cos 135°)+j4(\text{sen}135°)$
$\bar{f}=-2,828+j2,828$

$\bar{g}=2.(\cos 45°)+j2(\text{sen}45°)$
$\bar{g}=1,41+j1,41$

EJERCICIO 2

①

a- $\overbrace{(10-j5)+(-3+j2)}^{\text{parte real con real, im. con im.}}$
$7-j3$

b- $(-3+j2)+(5.(\cos 45°)+j5(\text{sen}45°))$
$(-3+j2)+(3,53+j3,53)$
$0,53+j5,53$

c- $(3,53+j3,53)+(2.(\cos 20°)+j2.(\text{sen}20°))$
$(3,53+j3,53)+(1,87+j0,68)$
$5,4+j4,21$

d- $(10-j5).(-3+j2)$
$-30+j20+j15+10$
$-20+j35$

e- $(-3+j2).(1,87+j0,68)$
$-5,61-j2,04+j3,74-1,36$
$-6,97+j1,7$

f- $(3,53+j3,53).(1,87+j0,68)$
$6,6+j2,4+j6,6-2,4$
$4,2+j9$

NOTA $\overline{23}=3,53+j3,53$ $\quad \overline{24}=1,87+j0,68$

g- $\frac{3,52 + j3,53}{1,87 + j0,68} \cdot \frac{1,87 - j0,68}{1,87 - j0,68} \rightarrow \frac{6,6 - j2,4 + j6,6 + 2,4}{1,87^2 + j0,68^2} \rightarrow \frac{9 + j4,2}{3,5 - 0,4} = \boxed{\frac{9}{3,1} + \frac{4,2}{3,1} j}$

$|\bar{g}| = \sqrt{(2,9)^2 + (-1,35)^2}$

$|\bar{g}| = 2,06$

h- $\frac{10 - j5}{-3 + j2} \cdot \frac{-3 - j2}{-3 - j2} \rightarrow \frac{-30 - j20 + j15 - 10}{9 + 4} \rightarrow \frac{-40 - j5}{13} = \boxed{\frac{-40}{13} - \frac{5}{13} j}$

$|\bar{h}| = \sqrt{(-3,07)^2 + (0,38)^2}$

$|\bar{h}| = 3,09$

i- $\frac{-3 + j2}{1,87 + j0,68} \cdot \frac{1,87 - j0,68}{1,87 - j0,68} \rightarrow \frac{5,61 - j2,04 + j3,74 + 1,36}{3,5 - 0,4} = \frac{6,97 + j1,74}{3,1} = \boxed{\frac{6,97}{3,1} + \frac{j1,74}{3,1}}$

j- $\alpha \overline{z_1 + z_2}$

$\tan^{-1}\left(\frac{-3}{7}\right) = \alpha_j = -23° \rightarrow \begin{matrix} 180° - 23° \\ 157° \end{matrix}$

K- $\alpha \overline{z_3} \cdot \overline{z_4}$

$\tan^{-1}\left(\frac{9}{4,2}\right) = \alpha K = 77,47°$

l- $\alpha \frac{\overline{z_3}}{\overline{z_2}} \rightarrow \frac{3,53 + j2,53}{-3 + j2} \cdot \frac{-3 - j2}{-3 - j2} \rightarrow \frac{-10,59 - j7,06 + j10,59 + 7,06}{9 + 4} \rightarrow \frac{-j17,65 - 3,53}{13}$

$\tan^{-1}\left(\frac{-1,35}{-0,27}\right) = \alpha l = 78,69°$

$-\frac{3,53}{13} - j\frac{17,65}{13}$

m- $\alpha z_1 \cdot z_2$

$\tan^{-1}\left(\frac{35}{-20}\right) = \alpha m = -60,25° \rightarrow \begin{matrix} 180° - 60,25° \\ \alpha m = 119,75° \end{matrix}$

n- $\alpha z_3 \cdot z_4$

$\tan^{-1}\left(\frac{9}{4,2}\right) = 64,95° = \alpha n$

DIVISIÓN EN POLAR (MÁS FÁCIL)

$\frac{\overline{z_1}}{z_2} = \frac{\sqrt{125}\, e^{-j26°}}{\sqrt{13}\, j147°} = \frac{\sqrt{125}}{\sqrt{13}} \underbrace{e^{-j26° - j147°}}_{\text{los } \alpha \text{ se restan}}$

los módulos se dividen

B { b- 1001 + 0110 = 1111
c- 1110 + 1010 = 11000
d- 10110 + 10101 = 101011
e- 11011 + 00110 = 100001
f- 10010 + 10110 = 101000 }

H { g- 7354 + 1123 = 8477
h- F1E5 + ABC1 = 19DA6
i- 3231 + 2123 = 5354 }

B { b- 10101 − 10011 = 00010
c- 11010 − 10111 = 00011 }

H { d- F91F − 0101 = F81E
e- 0334 − 0137 = 01FD
f- 1060 − 1770 = EF8EA }

AMC

Impedancias, fasores

SECCIÓN 9.3

(4) $R = 3\Omega$

$50A.\sen(200t+180°)$

a- $\frac{150v \sen 200t}{3\Omega} = i(t) = 50A.\sen 200t$

b- $\frac{30v.\sen(377t+20°)}{3\Omega} = i(t) = 10A\sen(377t+110°)$

c- $\frac{6v\cos(\omega t+10°)}{3\Omega} = i(t) = 3A\cos(\omega t+100°)$

d- $\frac{-12v\sen(\omega t+40°)}{3\Omega} = i(t) = -4A\sen(\omega t+130°)$

NOTA

$10^{-5} = 0{,}00001$ $10^{-3} = 0{,}001$

$0{,}\underbrace{000}_{m}\underbrace{000}_{\mu}\underbrace{000}_{p}\underbrace{000}_{n}$

5

a- $0{,}1A \operatorname{sen} 100t \cdot 7K\Omega = V(t) = 700v \operatorname{sen} 100t$

b- $2mA \operatorname{sen}(400t - 120°) = V(t) = 1V \operatorname{sen}(400t - 120°)$

6 2mH

a- $X_L = w \cdot L$ → $2\pi \cdot F$ → en cc la F es 0

$X_L = 0.2mH$

$X_L = 0\Omega$

b- $2\pi \cdot 60Hz = 377 = w$

$377 \cdot 2mH = 753m\Omega$

c- $2\pi \cdot 4kHz = 25K = w$

$25k \cdot 2mH = 50{,}26\Omega$

d- $2\pi \cdot 1{,}2MHz = 7{,}5M = w$

$7{,}5M \cdot 2mH = 15K\Omega$

7

a- $X_L = 2\pi f \cdot L$

$2K\Omega = 91K \cdot L$

$2K\Omega / 91K = L$

$20mH = L$

b- $L = X_L / 2\pi \cdot F$

$L = 40k\Omega / 33{,}3K$

$L = 1{,}2H$

8

a- $10\Omega = 2\pi \cdot f \cdot 1mH$

$10\Omega / 1mH = 2\pi \cdot f$

$10K / 2\pi = f$

$1{,}5KHz = f$

b- $X_L = 2\pi f \cdot 1mH$

$\frac{4K\Omega}{1mH \cdot 2\pi} = f$

$636kHz = f$

c- $\frac{12K\Omega}{1mH \cdot 2\pi} = f$

$1{,}9M = f$

9

a- $i(t) = 5 \operatorname{sen} wt$

$V(t) = 5A \cdot \overline{2L} \operatorname{sen}(wt + 90°) = 5A \cdot \overline{2L} \cos wt$

b- $V(t) = 40 \times 10^{-3} A \cdot \overline{2L} \cos(wt + 60)$

c- $V(t) = -6A \cdot \overline{2L} \cos(wt - 30°)$

10

a- $X_L = w \cdot L$

$X_L = 100 \cdot 0{,}1 = 10\Omega$

$V(t) = (10A \cdot 10\Omega) \cos(100t)$

b- $5mV \cdot 40\Omega \cdot \cos(400t + 20°) = V(t)$ ($X_L = 900/0{,}1 = 40\Omega$)

11

a- $i(t) = \left(\frac{120v}{50\Omega}\right) \operatorname{sen} wt$

b- $i(t) = \left(\frac{30v}{50\Omega}\right) \operatorname{sen}(w + 20°$

12

a- $X_L = 0{,}2H \cdot 60 = 12\Omega$

$i(t) = \left(\frac{1{,}5A}{12\Omega}\right) \operatorname{sen} 60t$

b- $X_L = 2\Omega$

$i(t) = \left(\frac{16mA}{2\Omega}\right) \operatorname{sen}(10t + 20°)$

13

a- $X_C = \frac{1}{wC}$

$X_C = \frac{1}{2\pi \cdot 0 \cdot C}$

$X_C = 1/0$

b- $1/2\pi \cdot 60Hz \cdot 5\mu F = X_C$

$530m\Omega = X_C$

c- $1/2\pi \cdot 2kHz \cdot 5\mu F = X_C$

$15m\Omega = X_C$

d- $1/2\pi \cdot 2MHz \cdot 5\mu F = X_C$

$15{,}9K\Omega = X_C$

14

a- $60\Omega = 1/2\pi \cdot 265Hz \cdot C$

$C = 1/2\pi \cdot 265Hz \cdot 60\Omega = 10\mu F$

b- $1{,}2K\Omega = 1/2\pi \cdot 34KHz \cdot C$

$C = 1/2\pi \cdot 34KHz \cdot 1{,}2K\Omega = 390pF$

15

a- $10\Omega = 1/2\pi \cdot F \cdot 3{,}9\mu F$

$F = 1/2\pi \cdot 10\Omega \cdot 3{,}9\mu F = 4KHz$

b- $F = 1/2\pi \cdot 1{,}2K\Omega \cdot 3{,}9\mu F = 34Hz$

c- $F = 1/2\pi \cdot 0{,}1\Omega \cdot 3{,}9\mu F = 408kHz$

d- $F = 1/2\pi \cdot 2K \cdot 3{,}9\mu F = 20Hz$

NOTA

$Z = \frac{\bar{V}}{\bar{I}}$ → Vrms / Irms

HOJA N°

FECHA 5/5

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Fasores, reactancias

16

a- $\left(\frac{120}{2,5}\right)\cos\omega t = i(t)$

b- $\left(\frac{4m}{25}\right)\cos\omega t = i(t)$

17

a- $X_C = 1/200 \cdot 1\mu F = 5K\Omega$

$i(t) = \left(\frac{30}{5K}\right)\cos(200t)$

b- $X_C = 1/377 \cdot 1\mu F = 2,65K\Omega$

$i(t) = 22,64\,mA\cos(377t)$

18

a- $V(t) = (50mA \cdot 10\Omega)\,sen(\omega t - 90°)$

b- $V(t) = (2mA \cdot 10\Omega)\,sen(\omega t + 30°)$

19

a- $X_C = 1/300 \cdot 0,56\mu F =$

$v(t) = \frac{200mA}{(1/300 \cdot 0,56\mu F)\Omega}\,sen(300t - 90°)$

b- $i(t) = 8mA\,sen(377t - 30°)$ → $30° \Rightarrow -\frac{1}{6}\pi$ rad

$v(t) = \frac{8mA}{(1/377 \cdot 0,56\mu F)\Omega} \cdot 6\,sen(377t - 120°)$

20

a- $\frac{550V}{11A} = 50\Omega = 2L$ → V adelanta a I

$50\Omega = 377 \cdot L$

$\frac{50}{377} = L$

b- $\bar{Z} = \frac{\bar{V}}{\bar{I}} = \frac{Vrms}{Irms} e^{j(\varphi_V - \varphi_I)}$

$\bar{Z} = \frac{V_P}{I_P} = \frac{36}{4}\Omega \cdot e^{j(-80 + 170)}$

$\bar{Z} = 9\Omega e^{j90}$ → adelanta 90°, es L

$\bar{Z}_L = 9\Omega$

$\frac{9\Omega}{\pi 54} = L$

c- $\frac{10,5}{1,5} e^{j(-13+13)} = \bar{Z}$

$7\Omega e^{j0^\circ} = \bar{Z}$ → Resistor

$7\Omega = R$

ANÁLISIS MATEMÁTICO

HOJA N°

FECHA

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IMP. Y ADM. (EN SERIE Y PARAL.)

⑤

Primer C.

$Z_T = R + jX_L - jX_C \Rightarrow Z_T = (3+j)\,\Omega = \boxed{3+j(4-5)}$

$Z_T = \underbrace{R}_{r} + j\underbrace{(X_L - X_C)}_{Im.}$

Segundo C.

$Z_T = 1 + j(2k + 6k - 4k) = \boxed{(1+4000)\,\Omega}$ (R; X_{L1}, X_{L2}, X_C)

Tercer C.

$Z_T = 470\Omega + j(X_{L1} + X_{L2} - X_C) =$ $\quad f = 1kHz$

$X_{L1} = 2\pi \cdot f \cdot 4mH = 295,3\,\Omega$

$X_{L2} = 2\pi \cdot f \cdot 200mH = 12,5\,\Omega$

$X_C = \frac{1}{2\pi \cdot f \cdot 0,1\mu F} = 1,5k\Omega$

$\rightarrow Z_T = \boxed{(470\Omega - j\,1,2k)\,\Omega}$

⑥

a- $I = \frac{V}{Z}$

$I = 60A\,e^{j70°}$
$V = 120v\,e^{j0°}$ $\quad Z = ?$

→ la impedancia es un capacitor, debido al adelantamiento de la corriente

$60A\,e^{j70°} \cdot Z = 120v\,e^{j0°} \Rightarrow \frac{120v\,e^{j0°}}{60A\,e^{j70°}} = \boxed{Z = 2\,\Omega\,e^{j(-70°)}}$ → divido los mod y resto los arg

⑦

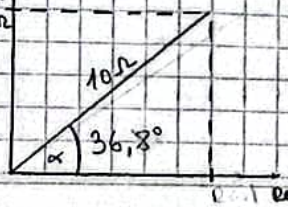
a- $Z_T = 8\,\Omega + j6\,\Omega$

$10\,e^{j36,8°}$

① Saco módulo $|Z_T| = \sqrt{8^2 + 6^2} = 10$

② Saco arg. $\alpha = \tan^{-1}\left(\frac{6}{8}\right) = 36,8°$

b-



NOTA

Energía Guardada

HOJA N°

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IMP. Y ADM

(7)

c- $\bar{I} = \frac{100V.e^{j0°}}{10\Omega.e^{j36,8°}} = \boxed{10A.e^{j(-36,8°)}}$

$\bar{V}R = (10A.e^{j(-36,8°)}).(8\Omega.e^{j0°}) = \boxed{80V.e^{j(-36,8°)}}$

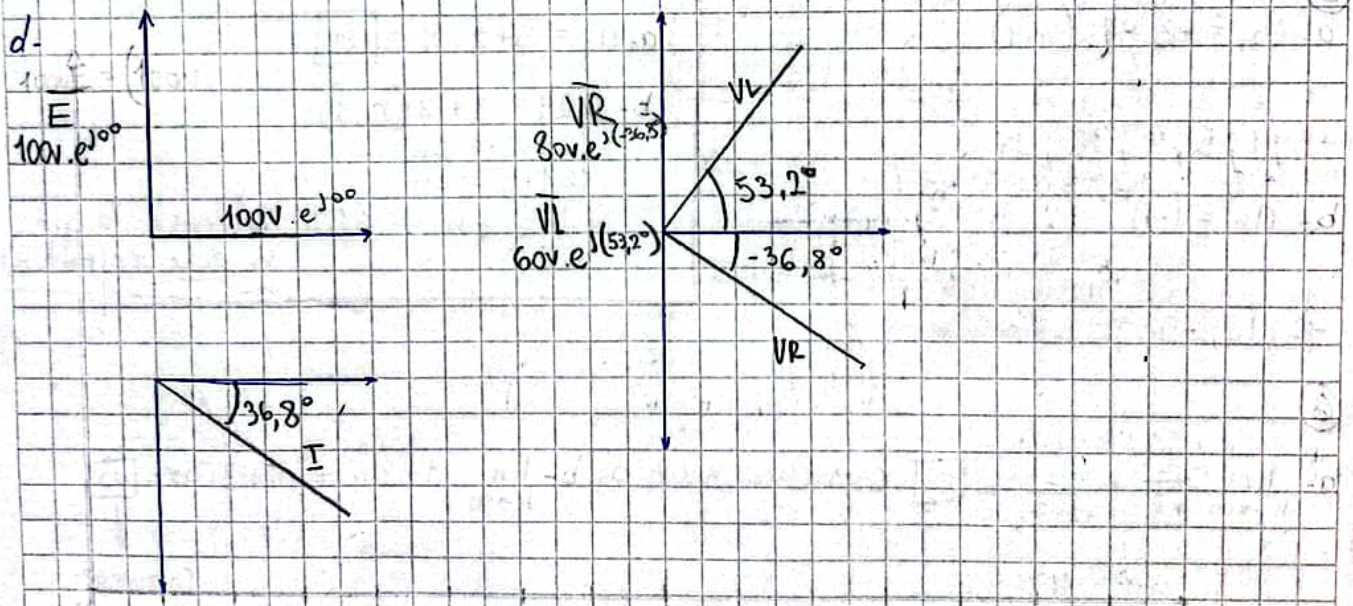
$\bar{V}L = 60V$. Ya que la caída de tensión en R es de 80V y VT = 100V. X

Por lo tanto, $\bar{V}T - \bar{V}R = 20\Omega = \bar{V}L$ X

$\rightarrow \bar{V}L = 20V.e^{j(90°-36,8°)} = 60V.e^{j(53,2°)}$

$\bar{V}L = \bar{I}.\bar{X}L = 60V$

d-



h- $v(t) = 100.\sqrt{2}.\text{sen}(2\pi.60Hz.t) \Rightarrow \boxed{v(t) = 141,4V.\text{sen}(120\pi.t)}$

$i(t) = 10.\sqrt{2}.\text{sen}(2\pi.60Hz.t - 36,8°) \Rightarrow i(t) = 14,14A.\text{sen}(120\pi.t - 36,8°$

$E_L = \frac{1}{2} \cdot L \cdot I^2$ | FECHA

AMC

Potencias → Pág. 664

①

a- $V = V_1 + V_2$

$V \cdot I_1 = (V_1 + V_2) I_1$

$P_T = \underbrace{V_1 I_1}_{P_{z1}} + V_2 I_1$

$I_1 = I_2 + I_3$

$P_T = P_{z1} + V_2 I_1$

$P_T = P_{z1} + V_2 (I_2 + I_3)$

$P_T = P_{z1} + \underbrace{V_2 \cdot I_2}_{P_{z2}} + \underbrace{V_2 \cdot I_3}_{P_{z3}}$

$P_T = P_{z1} + P_{z2} + P_{z3}$

$P_T = 60W + 45W + 25W = \boxed{130W}$

b- La pot. reactiva en un circuito puramente resistivo es igual a 0W. $P_Q = 0W$

En este caso la pot aparente es = P_T $P_S = 130W$

c- $I_f = \frac{P_T}{V} = \frac{130W}{240V} = 0,5A$

d- $V_f = \frac{P_{z1}}{I_f} = \frac{60W}{50mA} = \boxed{120V}$

$Z_1 = \frac{V_f}{I_f} = \frac{120V}{0,5A} = \boxed{240\Omega}$

$V_1 = V_T - V_f = 240V - 120V = \boxed{120V}$

e. $I_1 = \frac{P_{z2}}{V_1} = \frac{45W}{120V} = \boxed{0,37A}$

$I_2 = \frac{P_{z3}}{V_1} = \frac{25W}{120V} = \boxed{0,2A}$

$Z_2 = \frac{V_1}{I_1} = \frac{120V}{0,37A} = \boxed{324\Omega}$

$Z_3 = \frac{V_1}{I_2} = \frac{120V}{0,2A} = \boxed{600\Omega}$

---

②

a- $Z_T = R + X_L - X_C$

$Z_T = 3\Omega + j9\Omega - j5\Omega$

$Z_T = 3\Omega + j4\Omega$

$I_T = \frac{V_T}{Z_T}$

$I_T = \frac{50V e^{j0°}}{5\Omega e^{j53,1°}}$

$I_T = 10A\, e^{j-53,1°}$

$|Z_T| = \sqrt{3\Omega^2 + 4\Omega^2}$

$|Z_T| = \sqrt{25\Omega}$

$|Z_T| = 5\Omega$

$\varphi_2 = \text{TAN}^{-1}\left(\frac{4}{3}\right)$

$\varphi_2 = 53,1°$

$I^2 \cdot R \cdot \cos\varphi = P$ $\quad P_P \cdot \text{sen}\, P_2 = P_Q$ $\quad P_P + jP_Q = P_S$

$10A^2 \cdot 3\Omega \cdot \cos(0) = P_R$

$300W = P_R$

$10A^2 \cdot 5\Omega \cdot \cos(-90) = P_{XC}$

$0W = P_{XC}$

$10A^2 \cdot 9\Omega \cdot \cos(90) = P_{XL}$

$0W = P_{XL}$

b- $10A^2 \cdot 3\Omega \cdot \text{sen}(0) = P_{QR}$

$0VAR = P_{QR}$

$10A^2 \cdot 5\Omega \cdot \text{sen}(-90) = P_{QXC}$

$-500VAR = P_{QXC}$

$10A^2 \cdot 9\Omega \cdot \text{sen}(90) = P_{QXL}$

$900VAR = P_{QXL}$

c- $300W + j0VAR = P_{SR}$

$300VA = P_{SR}$

$+j0$

$0W + (-j)500VAR = P_{SXC}$

$0W + (-j)500VA = P_{SXC}$

$0W + j900VAR = P_{SXL}$

$0W + j900VA = P_{SXL}$

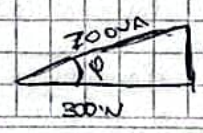
d- $P_T = P_R + P_{XC} + P_{XL} = 300W$

$P_{QT} = P_{QR} + P_{QXC} + P_{QXL} = 400VAR$

$P_{ST} = P_{SXC} + P_{SR} + P_{SXL} = 300W + j400VA$

$Fp = \cos\varphi = 1$

e-



f- $P_R \quad \frac{1}{T} = WR$

$300W \quad \frac{1}{\frac{1}{60}} = 5j$

g- $E_C = \frac{\frac{1}{2} \cdot 5\Omega \cdot 50V^2}{2} = 3,1kJ$

$E_L = \frac{1}{2} \cdot 9\Omega \cdot 10A^2 / 2 = 225J$

NOTA

HOJA Nº

FECHA

. MODEL mi Transis AKO : LN2222 (BF = 200)

SANTINO FAGGIOLI

③

a- $P_T = P_R + P_{XC} + P_{XL} = 400W$ (-400 VAR)

$P_Q = P_{QR} + P_{QC} + P_{QL} =$

$P_S = jP_Q + P_T = -j\,400VAR + 400W$

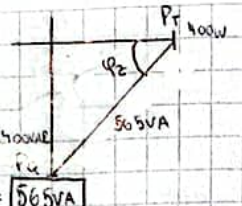
$|P_S| = \sqrt{P_Q^2 + P_T^2} = 565VA$

$FP = \cos(\varphi_2) = 0,7$

$\varphi_2 = 45°$ → $\cos^{-1}(FP)$

$\frac{P_T}{|P_S|}$

b-



c- $\bar{I} = \frac{P_T}{V_{rms} \cdot \cos\varphi_2} \cdot e^{j(\varphi_v - \varphi_2)}$

$\bar{I} = 5,65 \cdot e^{j90°}$ Irms

④

a- $P_T = 600W + 500W + 100W = 1200W$

$P_Q = 1200VAR + 1800VAR + 600VAR = 3600VAR$

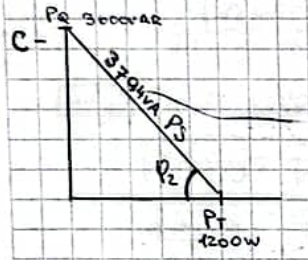
$P_S = j\,3600VAR + 1200W$

$|P_S| = \sqrt{P_Q^2 + P_T^2} = 3794VA$

b- $FP = \cos(\varphi_2) \Rightarrow \frac{P_T}{|P_S|} = 0,3$

$\varphi_2 = \cos^{-1}(FP) = 71,9°$

c-



d- $\bar{I} = \frac{P_T}{V_{rms} \cdot \cos\varphi_2} \cdot e^{j(\varphi_v - \varphi_2)}$

$\bar{I} = 77,25\,I_{rms} \cdot e^{j(-11,9)}$

⑤

a- $P_T = 100W + 200W + 0W + 50W = 350W$

$P_Q = 50VAR + 100VAR + 200VAR + 400VAR = 750VAR$

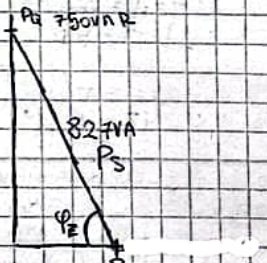
$P_S = j\,750VAR + 350W$

$|P_S| = \sqrt{P_Q^2 + P_T^2} = 827VA$

b- $FP = \frac{P_T}{|P_S|} = 0,42$

$\varphi_2 = \cos^{-1}(FP) = 65°$

c-



d- $\bar{I} = \frac{P_T}{V_{rms} \cdot \cos\varphi_2} \cdot e^{j(\varphi_v - \varphi_2)} = 16,5\,I_{rms} \cdot e^{j(-5°)}$

⑥

a- $I_R = \frac{60V}{20\Omega} = 3A$

$P_{RR} = 3A^2 \cdot 20\Omega \cdot \cos(0) = 180W$

$P_{QR} = 3A^2 \cdot 20\Omega \cdot \text{sen}(0) = 0VAR$

$|P_{SR}| = \sqrt{180W^2 + 0VAR^2} = 180VA$

b- $I_L = \frac{60V}{10\Omega} = 6A$

$P_{RL} = 6A^2 \cdot 10\Omega \cdot \cos(90) = 0W$

$P_{QL} = 6A^2 \cdot 10\Omega \cdot \text{sen}(90) = 360VAR$

$|P_{RL}| = \sqrt{0W^2 + 360VAR^2} = 360VA$

c- $P_R = 180W + 0W + 400W$

$P_R = 680W$

$P_Q = 0VAR + 600VAR + 360VAR$

$P_Q = 960VAR$

$|P_S| = \sqrt{680W^2 + 960VAR^2}$

$|P_S| = 1176VA$

$FP = \frac{P_R}{|P_S|} = 0,5$

NOTA

$$AVS = \frac{V_O}{V_S} = \underbrace{\frac{V_O}{V}}_{AVA} \cdot \frac{V}{V_S} \qquad \frac{V}{V_S} = \frac{V_S}{V_S} \cdot \frac{R_E // h_{ib}}{R_S + (R_E // h_{ib})}$$

$$AVS = AVA \cdot \frac{R_E // h_{ib}}{R_S + (R_E // h_{ib})} = \boxed{107}$$

AMC

Potencia

(7)

a- RESISTOR
$I_R = \frac{20V}{2\Omega} = \boxed{10A}$

$P_{RR} = 10A^2 \cdot 2\Omega \cdot \cos(0) = \boxed{200w}$

CAPACITOR
$I_C = \frac{20V}{5\Omega} = \boxed{4A}$

$P_{RC} = 4A^2 \cdot 5\Omega \cdot \cos(-90) = \boxed{0w}$

INDUCTOR
$P_{RL} = \boxed{0w}$

$I_L = \frac{20V}{4\Omega} = \boxed{5A}$

b- RESISTOR
$P_{QR} = 10A^2 \cdot 2\Omega \cdot \text{sen}(0) = \boxed{0VAR}$

CAPACITOR
$P_{QC} = 4A^2 \cdot 5\Omega \cdot \text{sen}(-90) = \boxed{-80VAR}$

INDUCTOR
$P_{QL} = 5A^2 \cdot 4\Omega \cdot \text{sen}(90) = \boxed{100VAR}$

c- RESISTOR
$|P_{SR}| = \sqrt{200w^2 + 0VAR^2} = \boxed{200VA}$

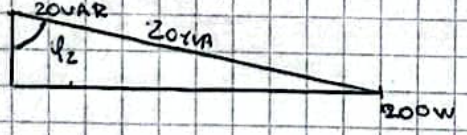
CAPACITOR
$P_{SC} = \sqrt{0w^2 + (-80VAR)^2} = 80VA$

INDUCTOR
$P_{SL} = \sqrt{0w + 100VAR^2} = \boxed{100VA}$

d- $P_T = \boxed{200w}$
$P_{QT} = \boxed{20VAR}$
$|P_{ST}| = \sqrt{200w^2 + 20VAR^2} = 201VA$

$FP = \frac{P_T}{|P_{ST}|} = \boxed{0,99}$

e-



f- $\bar{I} = \frac{P_T}{V_{rms} \cdot \cos\varphi_2} \cdot e^{j(\varphi_v - \varphi_2)} = 10,1 I_{rms} \cdot e^{j(\varphi_v - \varphi_2)}$

$10,1 I_{rms} \cdot e^{j(-8,10)}$

NOTA