

Questão 1

$$Z_{eqhA} = 2 - j\frac{28,125}{h} + \frac{(jh2)(-j\frac{50}{h})}{jh2 - j\frac{50}{h}}$$

$$\dot{V}_{Bh} = \dot{V}_h - (2 - j\frac{28,125}{h}) \times \dot{I}_{ABh}$$

$$\dot{I}_{ABh} = \frac{\dot{V}_{Ah}}{Z_{eqAh}}$$

$$\dot{I}_{Bh} = \frac{\dot{V}_{Bh}}{jh2}$$

$$\dot{I}_{Ch} = \frac{\dot{V}_{Bh}}{-j\frac{50}{h}}$$

Considerando-se $h = 1, 3$ e 5 nas equações indicadas, resultam os valores mostrados na tabela.

Observe que } para $h = 3 \rightarrow$ ressonância série
 para $h = 5 \rightarrow$ ressonância paralela

Tabela Questão 1

h	$\dot{V}_{A(h)}$ [V]	$Z_{eqA(h)}$ [Ω]	$\dot{I}_{A(h)}$ [A]	$\dot{I}_{B(h)}$ [A]	$\dot{I}_{C(h)}$ [A]	$\dot{V}_{B(h)}$ [V]	$P_{A(h)}$ [W]	$Q_{A(h)}$ [var]	$S_{A(h)}$ [VA]	$fp_{A(h)}$ [pu]
1	$353,55 \angle 10^\circ$	$26,12 \angle -85,6^\circ$	$13,54 \angle 95,6^\circ$	$14,10 \angle 95,6^\circ$	$0,56 \angle -84,39^\circ$	$28,20 \angle -144,39^\circ$	$366,47$	$-4771,77$	$4785,82$	$0,076$
3	$70,71 \angle 20^\circ$	$2 \angle 0^\circ$	$35,36 \angle 20^\circ$	$55,24 \angle 20^\circ$	$19,88 \angle -160^\circ$	$331,45 \angle 109,9^\circ$	$2499,99$	0	$2499,99$	1,00
5	$35,36 \angle -15^\circ$	∞	0	$3,54 \angle -105^\circ$	$3,54 \angle 75^\circ$	$35,36 \angle -15^\circ$	0	0	0	—

Assim, tem-se:

$$a) I_{Arms} = \sqrt{13,54^2 + 35,36^2} = 37,86 \text{ A}$$

$$I_{Brms} = \sqrt{14,10^2 + 55,24^2 + 3,54^2} = 57,12 \text{ A}$$

$$I_{Crms} = \sqrt{0,56^2 + 19,88^2 + 3,54^2} = 20,20 \text{ A}$$

$$b) DHT_{iA} = \frac{35,36}{13,54} \times 100 = 261,15\%$$

$$c) V_{Brms} = \sqrt{28,2^2 + 331,45^2 + 35,36^2}$$

$$V_{Brms} = 334,52 \text{ V}$$

$$d) P_T = P_A + P_{A3} + P_{A5} = 366,47 + 2500 + 0$$

$$P_T = 2834,52 \text{ W}$$

$$e) Q_T = Q_A + Q_{A3} + Q_{A5} = -4771,77 + 0 + 0$$

$$Q_T = -4771,77 \text{ var}$$

$$f) S_T = \sqrt{P_T^2 + Q_T^2} = \sqrt{2834,52^2 + 4771,77^2}$$

$$S_T = 5550,16 \text{ VA}$$

$$g) fp_A = \frac{P_{TA}}{S_{TA}}$$

$$fp_A = \frac{2834,52}{5550,16}$$

$$fp_A = 0,51 \text{ cap}$$

Questão ②

$$I_{rms} = \sqrt{I_1^2 + I_2^2 + I_3^2 + \dots + I_n^2} \Rightarrow I_{rms}^2 = I_1^2 + (I_2^2 + I_3^2 + \dots + I_n^2) \quad \textcircled{I}$$

$$DHT_I = \frac{\sqrt{I_2^2 + I_3^2 + \dots + I_n^2}}{I_1} \Rightarrow DHT_i^2 \times I_1^2 = (I_2^2 + I_3^2 + \dots + I_n^2) \quad \textcircled{II}$$

Substituindo-se ② em ①, resulta:

$$I_{rms}^2 = I_1^2 + (DHT_i^2 \times I_1^2)$$

$$\therefore I_{rms}^2 = I_1^2 (1 + DHT_i^2)$$

$$I_{rms} = I_1 \sqrt{1 + DHT_i^2} \quad \textcircled{10}$$

Portanto: $I_{rms} = 50 \sqrt{1 + 0,80^2}$

$$I_{rms} = 64,03 A \quad \textcircled{5}$$

Questão 3 *Questão do caderno!!!*

a) ressonância série no ramo de X_L para $h = 5$

$$\rightarrow j5X_{L1} = -j\frac{75}{5} \quad \hookrightarrow \quad \boxed{X_{L1} = j3\Omega} \quad (3)$$

$$b) \quad Z_{ABh} = \frac{\left(jh3 - j\frac{75}{h}\right)\left(R + jh2 - j\frac{98}{h}\right)}{jh3 - j\frac{75}{h} + R + jh2 - j\frac{98}{h}}$$

$$p/h = 7 \rightarrow Z_{AB7} = 2,88 \angle 16,26^\circ \Omega$$

$$\therefore \frac{(j21 - j10,71)(R + j14 - j14)}{(j21 - j10,71) + (R + j14 - j14)} = 2,88 \angle 16,26^\circ$$

$$\frac{j10,29 \times R}{j10,29 + R} = 2,88 \angle 16,26^\circ$$

$$\text{resultando: } \boxed{R = 3\Omega} \quad (7)$$