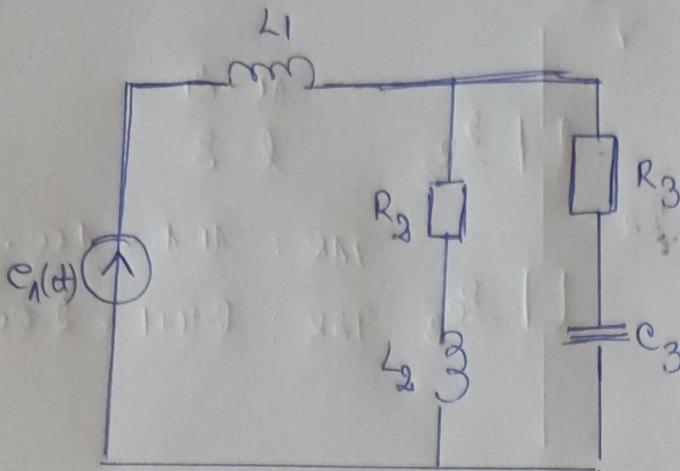


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Test 2 seminar



$$L_1 = \frac{6720}{77} \text{ mH}$$

$$C_3 = \frac{10000}{1056} \mu\text{F}$$

$$L_2 = \frac{10560}{121} \text{ mH}$$

$$R_2 = 96 \Omega, R_3 = 96 \Omega$$

$$e_1(t) = 2112 \cdot \sqrt{2} \cdot \sin(1100t + 8 \cdot \frac{\pi}{4}) \text{ [V]} \quad \omega = 1100 \text{ rad/s}$$

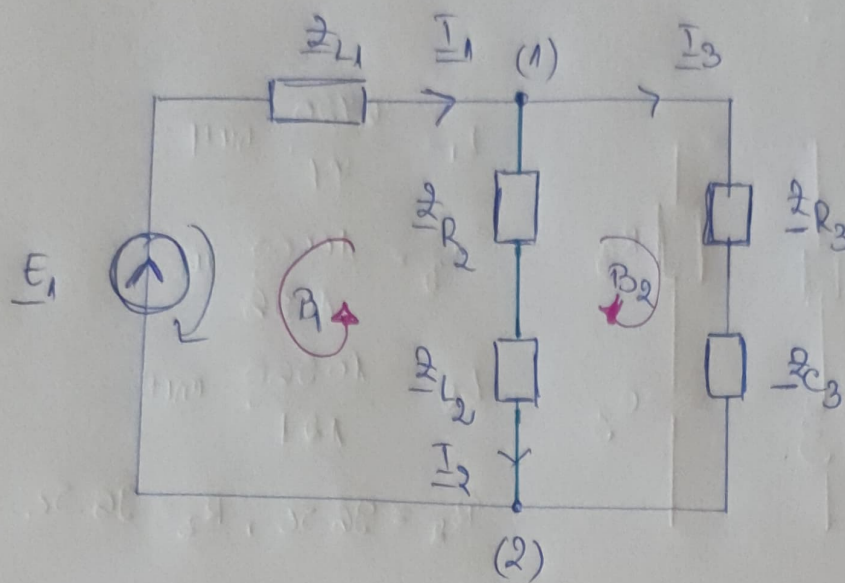
$$a) \underline{Z}_1 = j\omega L_1 = j \cdot 1100 \cdot \frac{6720}{77} \cdot 10^{-3} = \frac{6720}{7} j = 96 j$$

$$\underline{Z}_{C_3} = \frac{-j}{\omega C_3} = \frac{-j}{1100 \cdot \frac{10000}{1056} \cdot 10^{-6}} = \frac{-j}{11} = -\frac{1056}{11} j = -96 j$$

$$\underline{Z}_2 = j\omega L_2 = j \cdot 1100 \cdot \frac{10560}{121} \cdot 10^{-3} = 96 j$$

$$\underline{E}_1 = 2112 e^{j \cdot 2\pi} = 2112 \left(\underbrace{\cos 2\pi}_1 + j \cdot \underbrace{\sin 2\pi}_0 \right) = 2112 \text{ V}$$

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$$n=2$$

$$l=3$$

$$T1K: n-1 = 1 \text{ ec.}$$

$$T2K: l-n+1 = 2 \text{ ec.}$$

$$(S1): \underline{I}_1 = \underline{I}_2 + \underline{I}_3$$

$$(B1): \underline{E}_1 - \underline{I}_2 (\underline{Z}_{L2} + \underline{Z}_{R2}) - \underline{I}_1 \cdot \underline{Z}_{L1} = 0$$

$$(B2): \underline{I}_3 (\underline{Z}_{R3} + \underline{Z}_{C3}) - \underline{I}_2 (\underline{Z}_{L2} + \underline{Z}_{R2}) = 0$$

$$B_2: (96 - 96j) \underline{I}_3 = (96j + 96) \underline{I}_2 \Rightarrow (1-j) \underline{I}_3 = (1+j) \underline{I}_2$$

$$\Rightarrow \underline{I}_3 = \frac{1+j}{1-j} \cdot \underline{I}_2 \Rightarrow \underline{I}_3 = \frac{(1+j)^2}{1+1} \underline{I}_2 \Rightarrow$$

$$\Rightarrow \underline{I}_3 = \frac{2j}{2} \underline{I}_2 \Rightarrow \boxed{\underline{I}_3 = j \underline{I}_2}$$

$$B_1: 22 - \underline{I}_2 (96j + 96) - 96j \cdot \underline{I}_1 = 0 \quad | : 96$$

$$22 - \underline{I}_2 (1+j) - j \cdot \underline{I}_1 = 0 \Rightarrow \underline{I}_1 = \frac{22 - \underline{I}_2 (1+j)}{j} =$$

$$= \frac{22j - \underline{I}_2 (j-1)}{-1} \Rightarrow \boxed{\underline{I}_1 = \underline{I}_2 (j-1) - 22j}$$

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$$\underline{I}_1 \neq \underline{I}_2 + \underline{I}_3 \Rightarrow \underline{I}_2(j-1) - 22j = \underline{I}_2 + j\underline{I}_2 \Rightarrow$$

$$\Rightarrow \underline{I}_2(j-1-1-j) = 22j \Rightarrow \underline{I}_2 = \frac{22j}{-2} \Rightarrow \underline{I}_2 = -11j$$

$$\underline{I}_3 = j \cdot (-11j) = 11A$$

$$\underline{I}_1 = -11j(j-1) - 22j = 11 + 11j - 22j = 11 - 11j$$

$$\underline{I}_1 = 11 - 11j [A], \underline{I}_2 = -11j [A], \underline{I}_3 = 11 [A]$$

$$\underline{I}_1 = 11 - 11j [A]$$

$$\varphi_1 = \arctg \frac{-11}{11} = \arctg(-1) = -\frac{\pi}{4}$$

$$i_1(t) = 11\sqrt{2} \cdot \sqrt{2} \sin(1100t - \frac{\pi}{4}) \Rightarrow \boxed{i_1(t) = 22 \sin(1100t - \frac{\pi}{4})}$$

$$\underline{I}_2 = -11j [A]$$

$$\varphi_2 = \arctg \frac{-11}{0} = -\frac{\pi}{2}$$

$$\boxed{i_2(t) = 11\sqrt{2} \sin(1100t - \frac{\pi}{2})}$$

$$\underline{I}_3 = 11 [A]$$

$$\boxed{i_3(t) = 11\sqrt{2} \sin(1100t)}$$

$$\varphi_3 = \arctg \frac{0}{11} = 0$$

b) Bilantul puterilor complexe:

Putere absorbită: $\underline{S}_{a1} = \underline{Z}_1 \cdot \underline{I}_1^2$, $\underline{S}_{a2} = (\underline{Z}_{R2} + \underline{Z}_{L2}) \cdot \underline{I}_2^2$

$$\underline{S}_{a3} = (\underline{Z}_{R3} + \underline{Z}_{C3}) \cdot \underline{I}_3^2$$

$$\underline{S}_{a1} = 96j \cdot (11 - 11j)^2 = 96 \cdot 11^2 \cdot j(1-j)^2 = 11616 \cdot 2 = 23232 \text{ [VA]}$$

$$\underline{S}_{a2} = (96j + 96) \cdot (-1j)^2 = 96 \cdot 11^2 (1+j) \cdot (-1) = -11616(1+j)$$

$$\underline{S}_{a3} = (96 - 96j) \cdot 11^2 = 96 \cdot 11^2 (1-j)$$

$$\underline{S} = \underline{S}_{a1} + \underline{S}_{a2} + \underline{S}_{a3} = 96 \cdot 11^2 \cdot 2(1+j) = 23232(1+j)$$

Putere debitată: $\underline{S}_{d1} = \underline{E}_1 \cdot \underline{I}_1^*$

$$\underline{S}_{d1} = 2112 \cdot (11 + 11j) = 23232(1+j)$$

$$\underline{S}_a = \underline{S}_d$$

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c) Puterile S , S , P , Q absorbite de dipolul passiv
ce formează circuitul 2.

$$S_{a2} = (Z_{R2} + Z_{L2}) \cdot I_2^2 = (96j' + 96) \cdot (-11j')^2 =$$
$$= 96(1+j') \cdot 121j'^2 = -96 \cdot 121(1+j') =$$

$$= ~~11616~~ - 11616(1+j') = -11616 - 11616j' \text{ [VA]}$$

$$S_{a2} = 11616 \sqrt{2} \text{ [VA]} \quad \left(\sqrt{(-11616)^2 + (-11616)^2} \right)$$

$$P_{a2} = +11616 \text{ [W]} \quad (\text{Puterea activă pozitivă})$$

$$Q_{a2} = -11616 \text{ [var]}$$