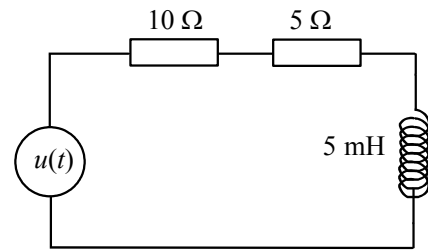
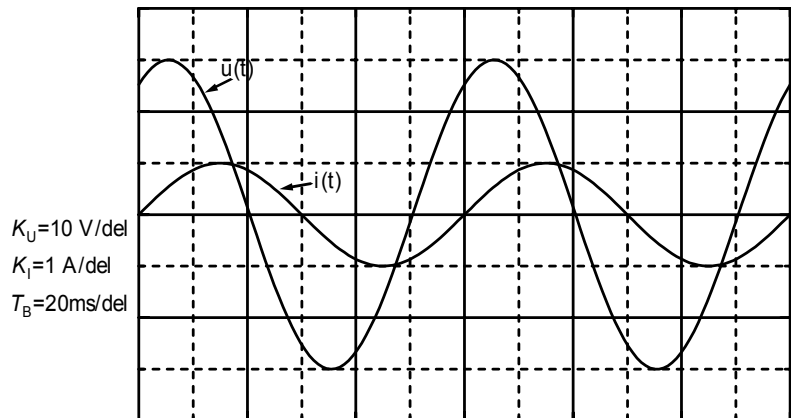


OSNOVE ELEKTROTEHNIKE II (VSŠ)
 drugi kolokvij, 1. junij 2004

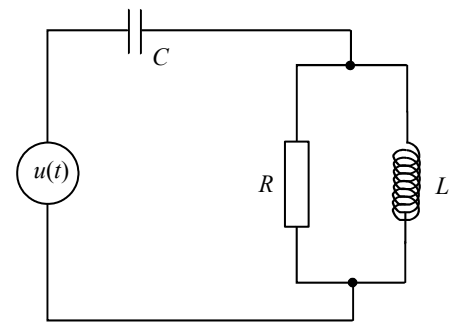
1. Kolika je napetost na 10 ohmski upornosti v trenutku, ko je napetost na tuljavi enaka nič? ($u(t) = 10\sqrt{2} \sin(10^3 t)$ V)



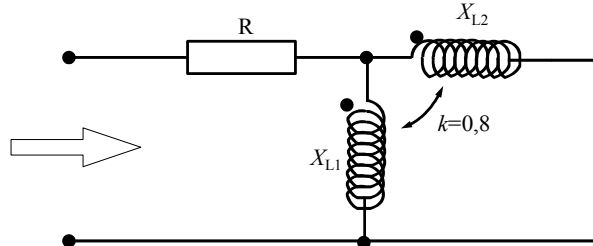
2. Na sliki sta podana oscilograma vhodne napetosti $u(t)$ in toka $i(t)$ v vezje. Določite trikotnik moči za dano vezje in impedančni značaj vezja (kapacitiven ali induktiven).



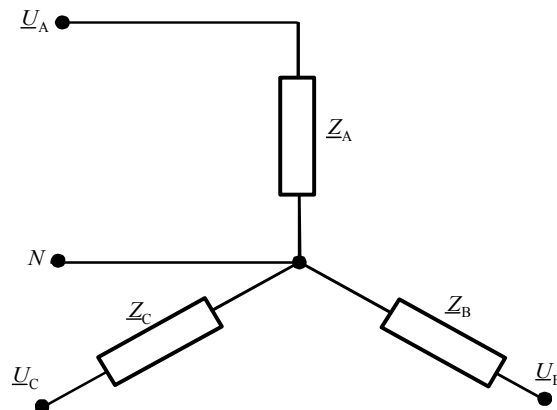
3. Za dano vezje določite kapacitivnost, da bo vezje v resonanci (fazni kot med tokom in napetostjo je nič). ($u(t) = 10 \sin(500t)$ V, $R = 10 \Omega$, $X_L = 4 \Omega$)



4. Danemu vezju določite vhodno impedanco. ($R = 15 \Omega$, $X_{L1} = 2 \Omega$, $X_{L2} = 5 \Omega$)



5. Trifazno nesimetrično breme v vezavi zvezda je priključeno na trifazno simetrično napajanje (pozitivno fazno zaporedje). Amplituda fazne napetosti je 325 V. Izračunajte tok po ničelnem vodniku. ($Z_A = 10 \Omega$, $Z_B = 10 + j12 \Omega$, $Z_C = 10 + j12 \Omega$)



REŠITVE

OSNOVE ELEKTROTEHNIKE II (VSŠ)

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$$1. U_{10\Omega} = \frac{U_{amp}}{\sqrt{(R_1 + R_2)^2 + (\omega L)^2}} R_1 = \frac{10\sqrt{2}}{\sqrt{15^2 + 5^2}} 10 = 8,94 \text{ V}$$

2. Najprej iz oscilograma odčitamo amplitudo napetosti in toka ($U_{AMP}=30 \text{ V}$, $I_{AMP}=1 \text{ A}$) ter fazni kot med tokom in napetostjo, ki znaša 60° . Nato izračunamo:

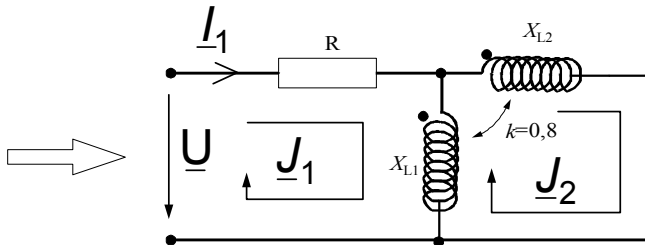
$$P = \frac{U_{AMP}}{\sqrt{2}} \frac{I_{AMP}}{\sqrt{2}} \cos 60 = 7,5 \text{ W}, \quad Q = \frac{U_{AMP}}{\sqrt{2}} \frac{I_{AMP}}{\sqrt{2}} \sin 60 = 12,99 \text{ Var in } S = \frac{U_{AMP}}{\sqrt{2}} \frac{I_{AMP}}{\sqrt{2}} = 15 \text{ VA}$$

Znacaj vezja je ohmsko-induktiven.

$$3. Y_{RL} = \frac{1}{R} + \frac{1}{jX_L} = \frac{1}{Z_{RL}}, \quad Z_{RL} = \frac{1}{\frac{1}{R} + \frac{1}{jX_L}} = 1,38 + j3,45 \Omega$$

$$|X_C| = |X_L| \Rightarrow \text{resonanca} \Rightarrow C = 579,710^{-6} \text{ F}$$

4.



$$Z_{VH} = \frac{U}{I_1}$$

$$\underline{J}_1 R + \underline{J}_1 jX_{L1} - \underline{J}_2 jX_{L1} + \underline{J}_2 jk\sqrt{X_{L1}X_{L2}} = U$$

$$- \underline{J}_2 jX_{L1} + \underline{J}_2 jX_{L2} - 2\underline{J}_2 jk\sqrt{X_{L1}X_{L2}} + \underline{J}_1 jk\sqrt{X_{L1}X_{L2}} - \underline{J}_1 jX_{L1} = 0$$

$$Z_{VH} = \frac{U}{I_1} = 15 + j1,86 \Omega$$

5.

$$\underline{U}_A = 325(1 + j0) \text{ V}$$

$$\underline{U}_B = 325(-0,5 - j0,866) \text{ V}$$

$$\underline{U}_C = 325(-0,5 + j0,866) \text{ V}$$

$$\underline{I}_A = \frac{\underline{U}_A}{Z_A} = 32,5 \text{ A}$$

$$\underline{I}_B = \frac{\underline{U}_B}{Z_B} = -20,5 - j3,54 \text{ A}$$

$$\underline{I}_C = \frac{\underline{U}_C}{Z_C} = 7,18 + j19,53 \text{ A}$$

$$\underline{I}_0 = \underline{I}_A + \underline{I}_B + \underline{I}_C = 19,18 + j15,98 \text{ A}$$