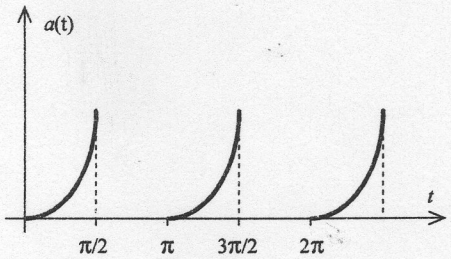
OSNOVE ELEKTROTEHNIKE II

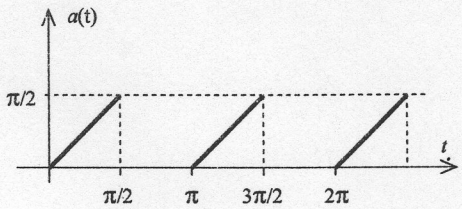
1. Izračunajte aritmetično srednjo vrednost signala, ki je podan z:

$$a(t)=\begin{cases} t^2, & 0\le t\le \dfrac{\pi}{2} \\ 0, & \dfrac{\pi}{2}\le t\le \pi \end{cases}$$

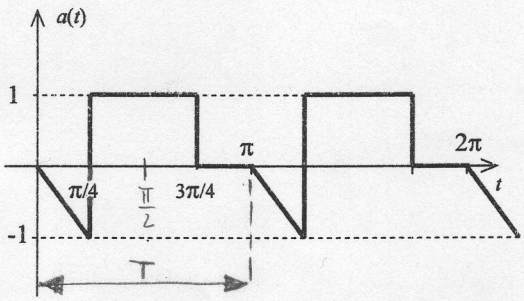


2. Izračunajte kvadratično srednjo vrednost signala, ki je podan z:

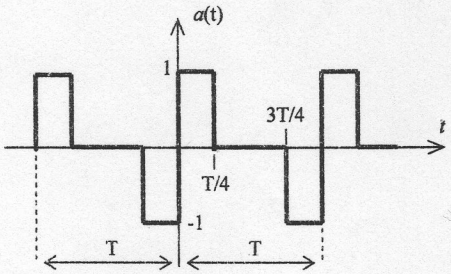
$$a(t)=\begin{cases} t\ , & 0\le t\le \dfrac{\pi}{2} \\ 0, & \dfrac{\pi}{2}\le t\le \pi \end{cases}$$



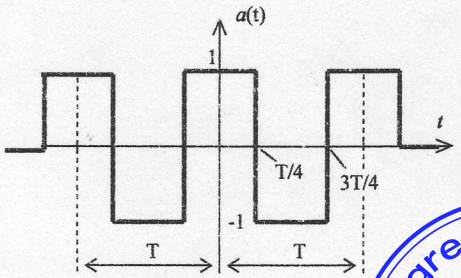
3. Izračunajte aritmetično in kvadratično srednjo vrednost (efektivno vrednost) signala na sliki.



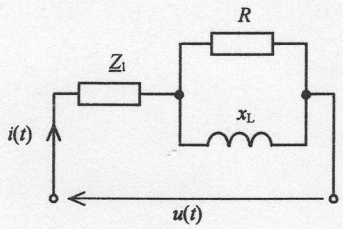
4. Razvijte izmenični signal na sliki v Fourierjevo vrsto.



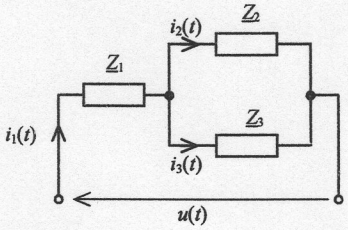
5. Razvijte izmenični signal na sliki v Fourierjevo vrsto.



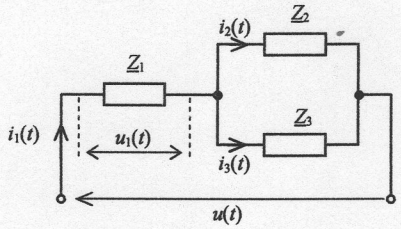
6. Za podano vezje določite trenutno vrednost pritisnjene napetosti $u(t)$, če je dana trenutna vrednost toka skozi vezje: $i(t) = 25 \cdot \cos(\omega t - 60°)$ A
$\underline{Z}_1 = 50 - j20\ (\Omega)$, $R = 20\ \Omega$ in $x_L = 50\ \Omega$.



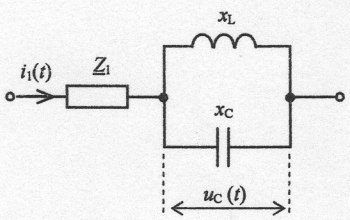
7. Za podano vezje izračunajte kompleksno navidezno moč, če je dana trenutna vrednost toka skozi impedanco $\underline{Z}_3$: $i_3(t) = 70{,}7 \cdot \cos(\omega t)$ A
$\underline{Z}_1 = 30 + j10\ (\Omega)$,
$\underline{Z}_2 = 20 + j15\ (\Omega)$,
$\underline{Z}_3 = 10 - j5\ (\Omega)$.



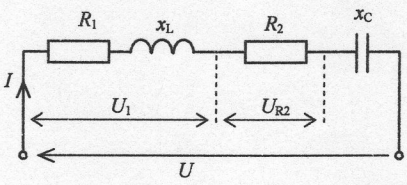
8. Za vezje na sliki izračunajte kompleksno navidezno moč, če je podana trenutna vrednost padca napetosti na impedanci $\underline{Z}_1$:
$u_1(t) = 140 \cdot \cos(\omega t - 45°)$ V
$\underline{Z}_1 = 10 + j20\ (\Omega)$,
$\underline{Z}_2 = -j20\ (\Omega)$,
$\underline{Z}_3 = 5 + j10\ (\Omega)$,



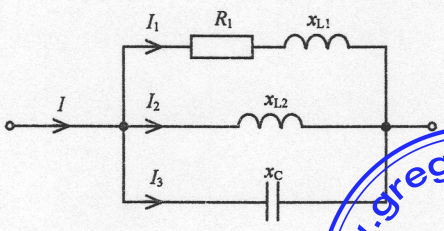
9. Izračunajte trenutno vrednost toka skozi vezje $i_1(t)$, če je dana trenutna vrednost padca napetosti na kondenzatorju:
$u_C(t) = 311 \cdot \cos(\omega t + 120°)$ V
$x_C = 40\ (\Omega)$ in $x_L = 50\ \Omega$.



10. V vezju na sliki poznamo efektivno vrednost pritisnjene napetosti $U = 100$ V in efektivni vrednosti padcev napetosti $U_1 = 70$ V in $U_{R2} = 60$ V.
Skicirajte kazalčni diagram napetosti in izračunajte kompleksno impedanco vezja, če je $x_L = 2R_1$ in $x_C = 10\ \Omega$.



11. V vezju na sliki poznamo efektivne vrednosti tokov $I = 7$ A, $I_1 = 8$ A in $I_2 = 6$ A.
Skicirajte kazalčni diagram tokov in izračunajte kompleksno admitanco (polno prevodnost) vezja, če je $x_{L1} = R_1$ in $x_C = 15\ \Omega$.



OF 16 ZBIRKA NALOG ①

$$a(t)=\begin{cases} t^2, & 0\le t\le \frac{\pi}{2} \\ 0, & \frac{\pi}{2}\le t\le \pi \end{cases} \qquad T=\pi$$

$$A_{sr}=\frac{1}{T}\int_0^T a(t)\,dt$$

$$A_{sr}=\frac{1}{\pi}\left(\int_0^{\frac{\pi}{2}} t^2\,dt+0\right)=\frac{1}{\pi}\cdot\frac{t^3}{3}\Big|_0^{\frac{\pi}{2}}=\frac{1}{3\pi}\cdot\frac{\pi^3}{8}=\frac{\pi^2}{24}\ V$$

— " — ②

$$a(t)=\begin{cases} t, & 0\le t\le \frac{\pi}{2} \\ 0, & \frac{\pi}{2}\le t\le \pi \end{cases}$$

$$A^2=\frac{1}{T}\int_0^T a^2(t)\,dt \qquad T=\pi$$

$$A^2=\frac{1}{\pi}\int_0^{\frac{\pi}{2}} t^2\,dt=\frac{1}{\pi}\cdot\frac{t^3}{3}\Big|_0^{\frac{\pi}{2}}=\frac{1}{3\pi}\cdot\frac{\pi^3}{8}=\frac{\pi^2}{24}$$

$$\Rightarrow A=\frac{\pi}{2\sqrt{6}}$$

$T = \pi$

$$a(t) = \begin{cases} -\frac{4}{\pi}\cdot t\,; & 0 \le t \le \frac{\pi}{4} \\ 1\,, & \frac{\pi}{4} \le t \le \frac{3\pi}{4} \\ 0\,, & \frac{3\pi}{4} \le t \le \pi \end{cases}$$

$T = \pi$

$$A_{sr} = \frac{1}{T}\int_0^T a(t)\,dt$$

$$A_{sr} = \frac{1}{\pi}\left(\int_0^{\frac{\pi}{4}} -\frac{4}{\pi}\cdot t\,dt + \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} dt\right) = \frac{1}{\pi}\left(\frac{4}{\pi}\,\frac{t^2}{2}\Big|_0^{\frac{\pi}{4}} + t\Big|_{\frac{\pi}{4}}^{\frac{3\pi}{4}}\right) = \frac{1}{\pi}\left(-\frac{8}{\pi}\cdot\frac{\pi^2}{128} + \frac{\pi}{2}\right)$$

$$A_{sr} = \frac{1}{\pi}\left(-\frac{\pi}{16} + \frac{4\pi}{8}\right) \Rightarrow \underline{\underline{A_{sr} = \frac{3}{8}\ V}}$$

$$A^2 = \frac{1}{T}\int_0^T a^2(t)\,dt$$

$$A^2 = \frac{1}{\pi}\left(\int_0^{\frac{\pi}{4}}\left(-\frac{4}{\pi}t\right)^2 dt + \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} dt\right) = \frac{1}{\pi}\left(-\frac{16}{\pi^2}\cdot\frac{t^3}{3}\Big|_0^{\frac{\pi}{4}} + t\Big|_{\frac{\pi}{4}}^{\frac{3\pi}{4}}\right)$$

$$= \frac{1}{\pi}\left(-\frac{16}{3\pi^2}\cdot\frac{\pi^3}{64} + \frac{\pi}{2}\right) = \frac{1}{\pi}\left(\frac{\pi}{12} + \frac{6\pi}{12}\right)$$

$$\Rightarrow \underline{\underline{A = \sqrt{\frac{7}{12}}\ V}}$$

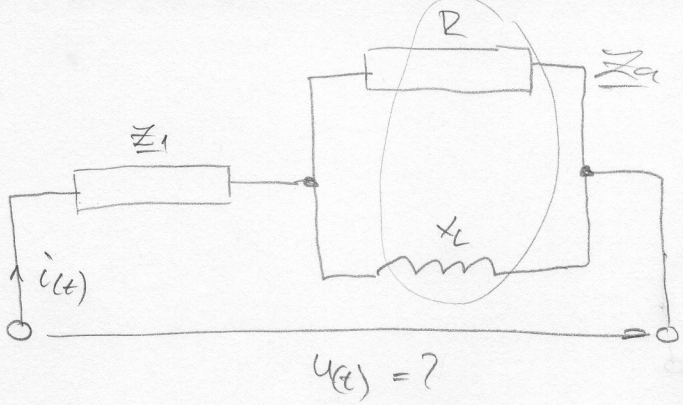
ZBIRKA KATOG (6)

$i(t) = 25\cos(\omega t - 60°)\ A$

$\underline{Z}_1 = 50 - j20\ \Omega$

$R = 20\ \Omega$

$X_L = 50\ \Omega$



$$\underline{Z}_{ce} = \frac{R X_L}{R + X_L} = \frac{20\, j50}{20 + j50} = 17{,}24 + j6{,}89\ \Omega$$

$$\underline{Z} = 67{,}24\ j13{,}1\ \Omega$$

$$\underline{I} = \frac{25}{\sqrt{2}}\, e^{-j60°} = 8{,}84 - j15{,}3\ A$$

$$\underline{U} = \underline{I}\,\underline{Z} = 3973 - j1145{,}24\ V$$

$$= 12110{,}3\, e^{j71{,}03°}$$

$$\boxed{u(t) = 17\,12{,}66 \cdot \cos(\omega t\ 71{,}03°)\ V}$$