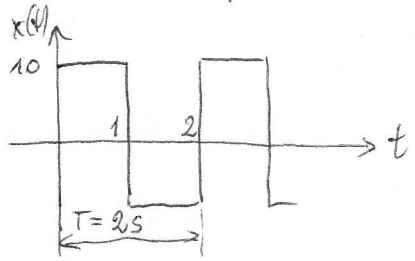
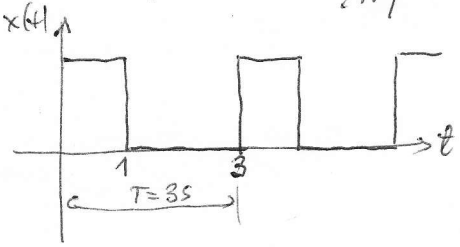
Circuits & systems, Tutorials No 8

1. Find the coefficients of Fourier series of the signal x(t)





2. Present the given Fourier series in complex form

$x(t) = 10 + 28\sin\omega t + 32\cos 2\omega t + 18\sin(2\omega t + 40^\circ)$

$x(t) = 6 + 20\sin\omega t + 20\cos\omega t + 10\cos(2\omega t + 45^\circ)$

Draw the magnitude and phase spectra.

3. Calculate $\overline{f(t)g(t)}$ using Parseval theorem

a) $f(t) = 2 + 10\sin\omega t + 10\cos\omega t + 20\sin 2\omega t$

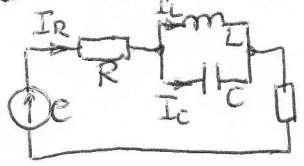
$g(t) = 4 + 20\sin\omega t + 18\cos 2\omega t + 16\cos 3\omega t$

b) $f(t) = 3 + 12\cos\omega t + 14\cos(2\omega t + 30^\circ) + 16\sin(3\omega t)$

$g(t) = 7 + 22\sin\omega t + 24\sin(2\omega t + 60^\circ) + 18\cos(3\omega t + 45^\circ)$

4. Calculate rms values of the currents

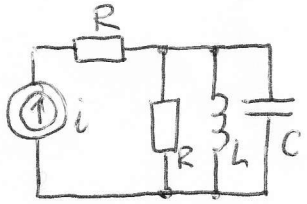
a)



$e(t) = 10 + 20\sqrt{2}\sin\omega t + 16\sqrt{2}\sin(2\omega t + 45^\circ)$

$\omega = 1$, $R = 2\Omega$, $L = 1H$, $C = 1F$

b)

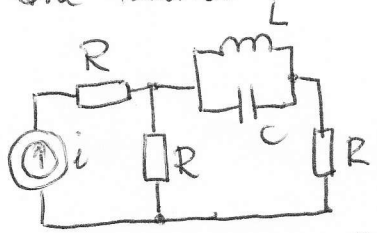


$i(t) = 5 + 10\sqrt{2}\sin t + 8\sqrt{2}\sin 2t$

$R = 5\Omega$, $L = 1H$, $C = \frac{1}{4}F$

5. Calculate the rms values of currents and all types of power of the source

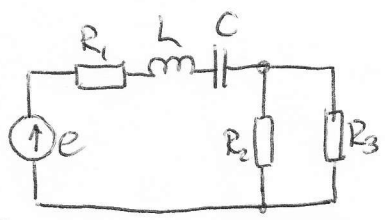
a)



$i(t) = 2 + 4\sqrt{2}\sin t + 2\sqrt{2}\sin 2t$

$R = 2\Omega$, $L = 1H$, $C = 1F$

b)



$e(t) = 3 + 10\sqrt{2}\sin t + 8\sqrt{2}\sin 2t$

$R_1 = 2\Omega$, $R_2 = 20\Omega$, $R_3 = 30\Omega$

$L = 1H$, $C = 1F$