

## ELECTRICAL CIRCUIT THEORY

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### Task II\_1

The harmonic voltage generator acts upon the input of the electric circuit shown in the figure II\_1, containing the first and third harmonic.

The following data are known (marks given in the figure):

$$u(t) = 162\sqrt{2} \sin \omega t + U_{eff,3} \sqrt{2} \sin(3\omega t + \theta_3) \text{ [V]},$$

$$i(t) = I_{eff,1} \sqrt{2} \sin(\omega t + \psi_1) \text{ [A]},$$

$$u_{L1}(t) = 162 \sin\left(\omega t + \frac{\pi}{4}\right) + 117\sqrt{2} \sin(3\omega t) \text{ [V]}.$$

The resistances of the named resistors and the reactance of the named reactive elements for the basic circular frequency  $\omega$  are:  $R = \frac{81}{8} \Omega$ ,  $R_1 = 8 \Omega$ ,  $X_{L1} = \omega L_1 = 9 \Omega$ ,  $X_{L2} = \omega L_2 = 16 \Omega$ ,  $X_M = \omega L_{12} = 9 \Omega$ .

Determine:

a/ the values of the condenser reactances for the basic circular frequency  $\omega$ ,  
 $X_{C1} = \frac{1}{\omega C_1}$ ,  $X_{C2} = \frac{1}{\omega C_2}$ ;

b/ the time function of the voltage i.e. the current, at the input,  $u(t)$  and  $i(t)$ .

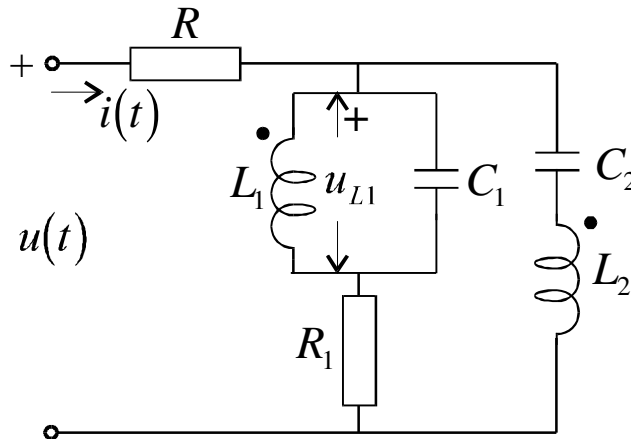


Fig. II\_1