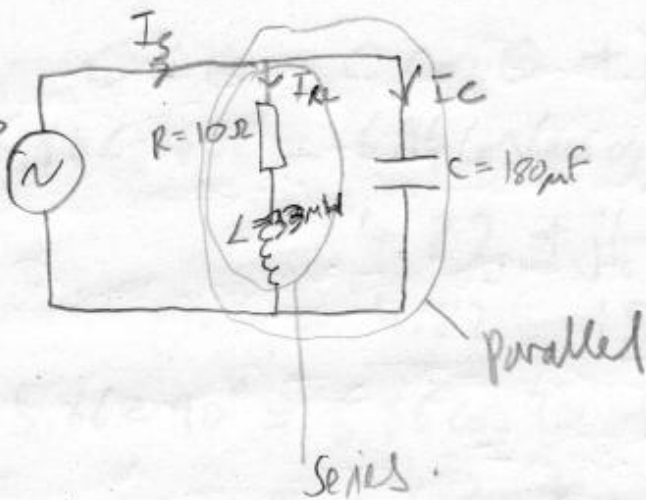


EXAMPLE

$$V = 100 \angle 0^\circ$$

$$f = 50 \text{ Hz}$$



SERIES LR, PARALLEL C,
LRC-CIRCUIT

$$\therefore X_L = 2\pi fL = 2\pi(50)(33 \times 10^{-3}) = \underline{\underline{10.37 \Omega}}$$

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2\pi(50)(180 \times 10^{-6})} = \underline{\underline{17.68 \Omega}}$$

Thus, each component now has its resistance (reactance)

Impedance of series part, RL :-

Inductance and resistance in series $Z = R + jX_L = R + j\omega L$
where $\omega = 2\pi f$

$$Z = 10 + j10.37 \Omega$$

in polar form :- $A \angle \theta$

$$\therefore A = \sqrt{10^2 + 10.37^2} = 14.406 = \underline{\underline{14.41}}$$

$$\theta = \arctan\left(\frac{X_L}{R}\right) = \arctan\left(\frac{10.37}{10}\right) = \underline{\underline{46.04^\circ}}$$

$$\therefore A \angle \theta = \underline{\underline{14.41 \angle 46.04^\circ \Omega}}$$

$$\therefore I_{RL} = \frac{V}{Z_{RL}} = \frac{100 \angle 0^\circ}{14.41 \angle 46.04^\circ} = \frac{Z_1 \angle (\theta_1 - \theta_2)}{Z_2} = \underline{\underline{6.94 \angle -46.04^\circ \text{ A}}}$$

$$I_C = \frac{V}{X_C} = \frac{100 \angle 0^\circ}{17.68 \angle -90^\circ} = \frac{100}{17.68} \angle (0 - (-90^\circ)) = \underline{\underline{5.66 \angle 90^\circ \text{ A}}}$$

In rectangular form $C \angle \theta \rightarrow a + jb$

$$a = C \cos \theta$$

$$b = C \sin \theta$$

P, t, o, ...

$$C \angle \theta = C \cos \theta + j(C \sin \theta)$$

$$\begin{aligned}\therefore 6.94 \angle -46.04^\circ &= 6.94 \cos(-46.04) + j(6.94 \sin -46.04) \\ &= 4.82 + j(-4.995) \\ &= \underline{4.82 - j5.00}\end{aligned}$$

$$\begin{aligned}\therefore 5.66 \angle 90^\circ &= 5.66 \cos 90 + j(5.66 \sin 90) \\ &= \underline{0 + j5.66}\end{aligned}$$

$$\begin{aligned}\therefore I_s = I_{R_L} + I_C &= (4.82 - j5.00) + (0 + j5.66) \\ &= \underline{4.82 + j0.66 \text{ A}}\end{aligned}$$

\therefore in polar form; $A \angle \theta$

$$a + jb \rightarrow C \angle \theta; \quad A = \sqrt{a^2 + b^2} = \sqrt{4.82^2 + 0.66^2}$$

$$= \underline{4.86}$$

$$\theta = \arctan\left(\frac{b}{a}\right) = \tan^{-1}\left(\frac{0.66}{4.82}\right) = \underline{7.79^\circ}$$

$$\therefore A \angle \theta = \underline{\underline{4.86 \angle 7.79^\circ}}$$