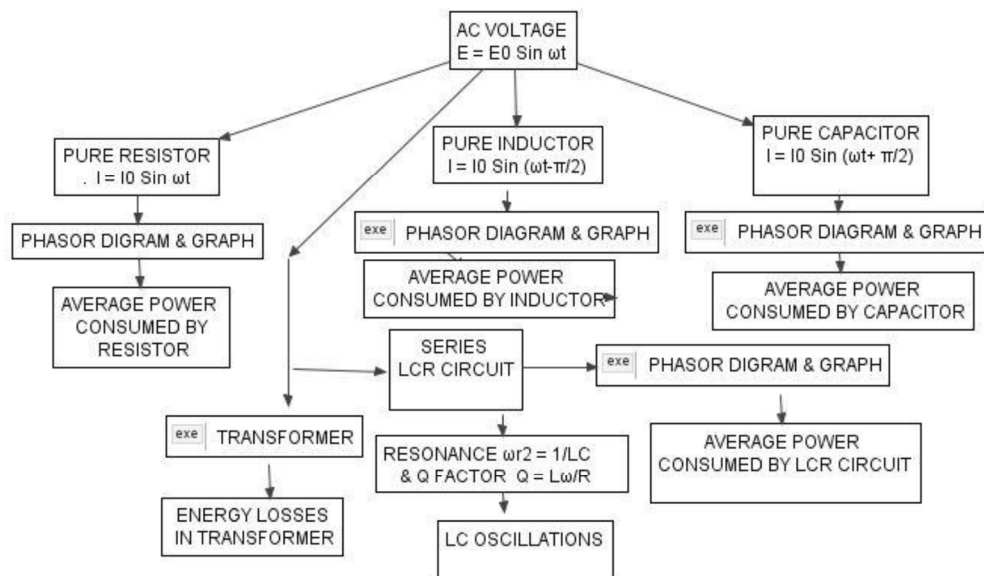




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(I) Parameters of various combinations of components in ac circuits

S. No.	Circuit containing	Alt. e.m.f fed	Alt. current developed	Impedance Z	Phase relation between E and I	Average Power	Power factor
1.	Resistance only	$E = E_0 \sin \omega t$	$I = I_0 \sin \omega t$	$Z = R$	In phase	$I_v^2 R$	$\cos \phi = 1$
2.	Pure inductor	$E = E_0 \sin \omega t$	$I = I_0 \sin (\omega t - 90^\circ)$	$Z = X_L = \omega L$	I lags behind E by 90°	Zero	$\cos \phi = 0$
3.	Pure capacitor	$E = E_0 \sin \omega t$	$I = I_0 \sin (\omega t + 90^\circ)$	$Z = X_C = \frac{1}{\omega C}$	I leads E by 90°	Zero	$\cos \phi = 0$
4.	RL circuit	$E = E_0 \sin \omega t$	$I = I_0 \sin (\omega t - \theta)$	$Z = \sqrt{R^2 + X_L^2}$	$\tan \phi = \frac{X_L}{R}$ (current lags)	$E_v I_v \cos \phi$	$\cos \phi = \frac{R}{\sqrt{R^2 + X_L^2}}$
5.	RC circuit	$E = E_0 \sin \omega t$	$I = I_0 \sin (\omega t + \theta)$	$Z = \sqrt{R^2 + X_C^2}$	$\tan \phi = \frac{X_C}{R}$ (current leads)	$E_v I_v \cos \phi$	$\cos \phi = \frac{R}{\sqrt{R^2 + X_C^2}}$
6.	RLC circuit	$E = E_0 \sin \omega t$	$I = I_0 \sin (\omega t \pm \theta)$	$Z = \sqrt{R^2 + (X_L - X_C)^2}$	$\tan \phi = \frac{X_C - X_L}{R}$	$E_v I_v \cos \phi$	$\cos \phi = \frac{R}{\sqrt{R^2 + (X_L - X_C)^2}}$