

1) The Voltage is given by

$$V = 100 \sin(100\pi t + \frac{\pi}{6}) \text{ V}$$

Obtain the polar and rectangular forms.

Soln ::

$$\text{Polar} \Rightarrow r \angle \phi$$

$$\text{Rectangular} = X + jY$$

$$\text{Gn, } V = 100 \sin(100\pi t + \frac{\pi}{6})$$

$$V = V_m \sin(\omega t + \phi)$$

$$V_m = 100$$

$$\phi = \frac{\pi}{6} = \frac{180}{6} = 30^\circ$$

$$\omega = 100\pi$$

$$r = V_{\text{Rms}} = \frac{V_m}{\sqrt{2}} = 70.7$$

$$\text{Polar coordinates: } 70.7 \angle 30^\circ \text{ V}$$

Rectangular coordinates:

$$= r \cos \phi + j r \sin \phi$$

$$= 70.7 \cos 30^\circ + j 70.7 \sin 30^\circ$$

$$= 61.22 + j 35.35$$

2) Find RMS Value and phase of the current $\hat{I} = 25 + j40$ A

Soln: Convert to polar form

$$r = \sqrt{x^2 + y^2} = \sqrt{(25)^2 + (40)^2} = 47.17 \text{ A}$$

$$\phi = \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(\frac{40}{25}\right) = 58^\circ$$

$$\hat{I}_{\text{RMS}} = 47.17 \text{ A}$$

$$\phi = 58^\circ$$

$$\phi \angle \phi$$

$$\hat{I}_{\text{rms}}$$

$$V_{\text{rms}}$$

3) Find the resultant of three
Voltage given by $V_1 = 10 \sin \omega t$

$$V_2 = 20 \sin\left(\omega t - \frac{\pi}{4}\right) \quad V_3 = 30 \sin\left(\omega t + \frac{\pi}{6}\right)$$

Soln An.

$$V_1 = 10 \sin \omega t \quad \text{--- ①}$$

$$V_2 = 20 \sin(\omega t - 45^\circ) \quad \text{--- ②}$$

$$V_3 = 30 \sin(\omega t + 30^\circ) \quad \text{--- ③}$$

For eq ① Polar coordinates.

$$V_{rms} = \frac{10}{\sqrt{2}} = 7V, \quad \phi = 0$$

Polar coord. $\Rightarrow 7 \angle 0^\circ V$

Polar coordinate for eq ②

$$V_{rms} = \frac{20}{\sqrt{2}} = 14.14V$$

$$\phi = -45^\circ$$

Polar coordinate $= 14.14 \angle -45^\circ$

Polar co-ordinates for eq ③

$$V_{rms} = \frac{30}{\sqrt{2}} = 21.2V$$

$$\phi = 30^\circ$$

Polar co-ordinate $\Rightarrow 21.2 \angle 30^\circ V$

Rectangular Coordinates.

$$q① \Rightarrow : r \cos \phi + jr \sin \phi$$

$$= 7 \cos 0^\circ + j 7 \sin 0$$

$$V_{11} \therefore 7 + j0$$

$$q② \Rightarrow 14 \cdot 14 \cos(-45^\circ) + j 14 \cdot 14 \sin(-45^\circ)$$

$$= 14 \cdot 14 \cos(45^\circ) - j 14 \cdot 14 \sin(45^\circ)$$

$$= 14 \cdot 14 \times \frac{1}{\sqrt{2}} - j 14 \cdot 14 \times \frac{1}{\sqrt{2}}$$

$$V_{22} = 10 - j10$$

$$\begin{aligned} \cos(-\theta) &= \cos \theta \\ \sin(-\theta) &= -\sin \theta \end{aligned}$$

$$q③ \quad 21.2 \cos 30^\circ + j 21.2 \sin 30^\circ$$

$$V_{33} = 18.36 + j10.6$$

$$V = V_{11} + V_{22} + V_{33}$$

$$= (7 + 10 + 18.36) + j(0 - 10 + 10.6)$$

$$V = 35.36 + j0.6$$

Polar Co-ordinates.

$$r = \sqrt{x^2 + y^2} = \sqrt{(35.36)^2 + (0.6)^2}$$

$$r = 35.37 \text{ V}$$

$$\phi = \tan^{-1}\left(\frac{Y}{X}\right) = \tan^{-1}\left(\frac{0.6}{35.36}\right) = 0.97^\circ$$

$$V_{rms} = 35.37 \text{ V}$$

$$V_{rms} = \frac{V_m}{\sqrt{2}}$$

$$\phi = 0.97^\circ$$

$$V = V_m \sin(\omega t + \phi)$$

$$\begin{aligned} V_m &= \sqrt{2} \times V_{rms} \\ &= \sqrt{2} \times 35.37 \end{aligned}$$

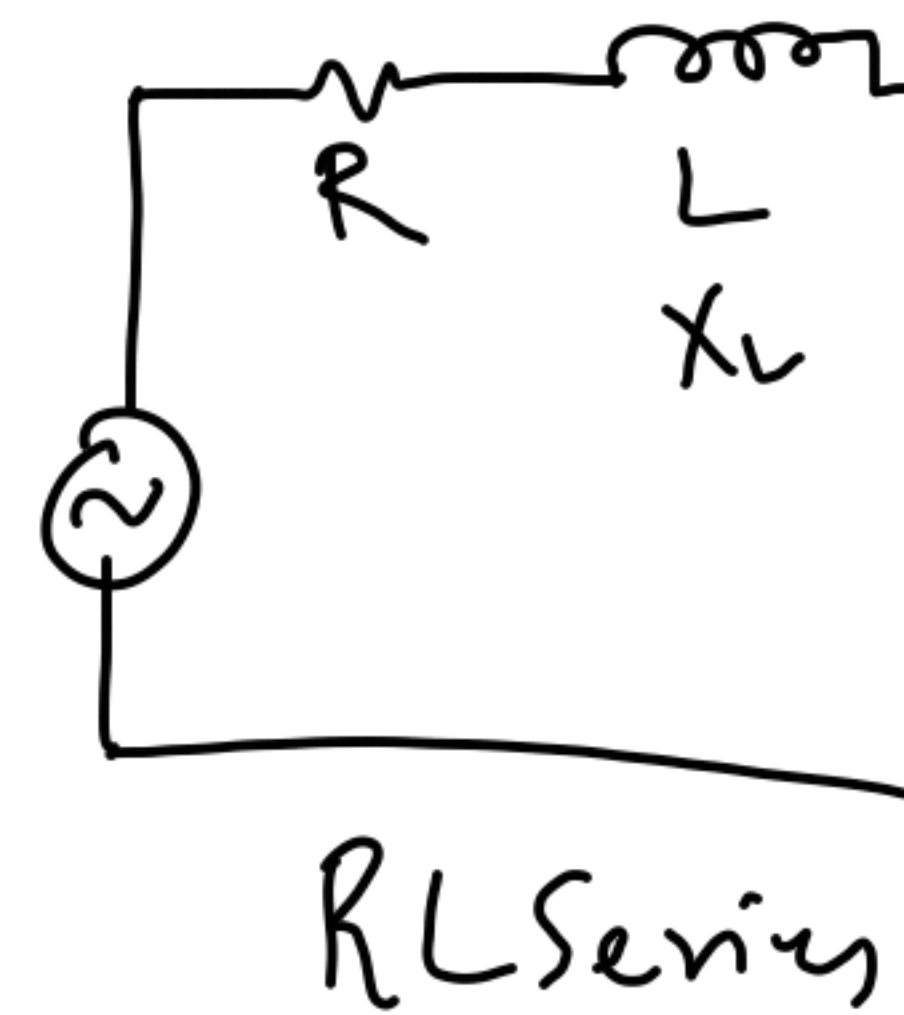
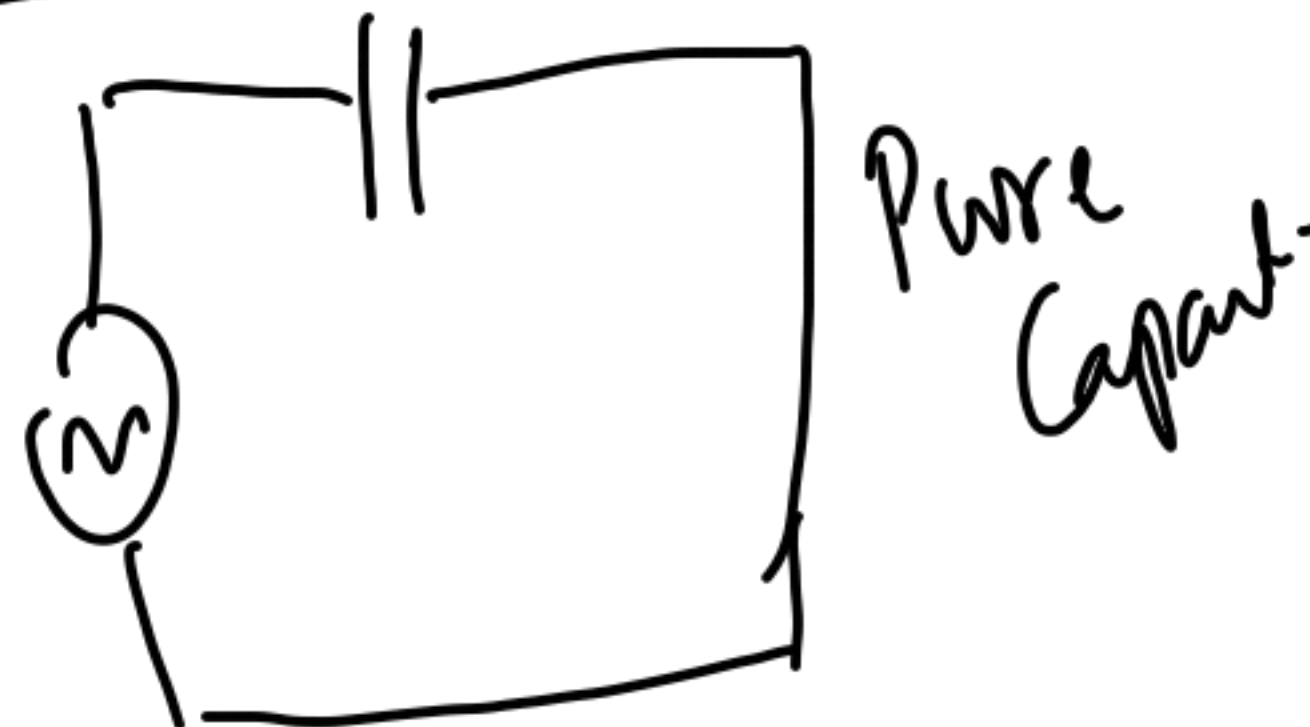
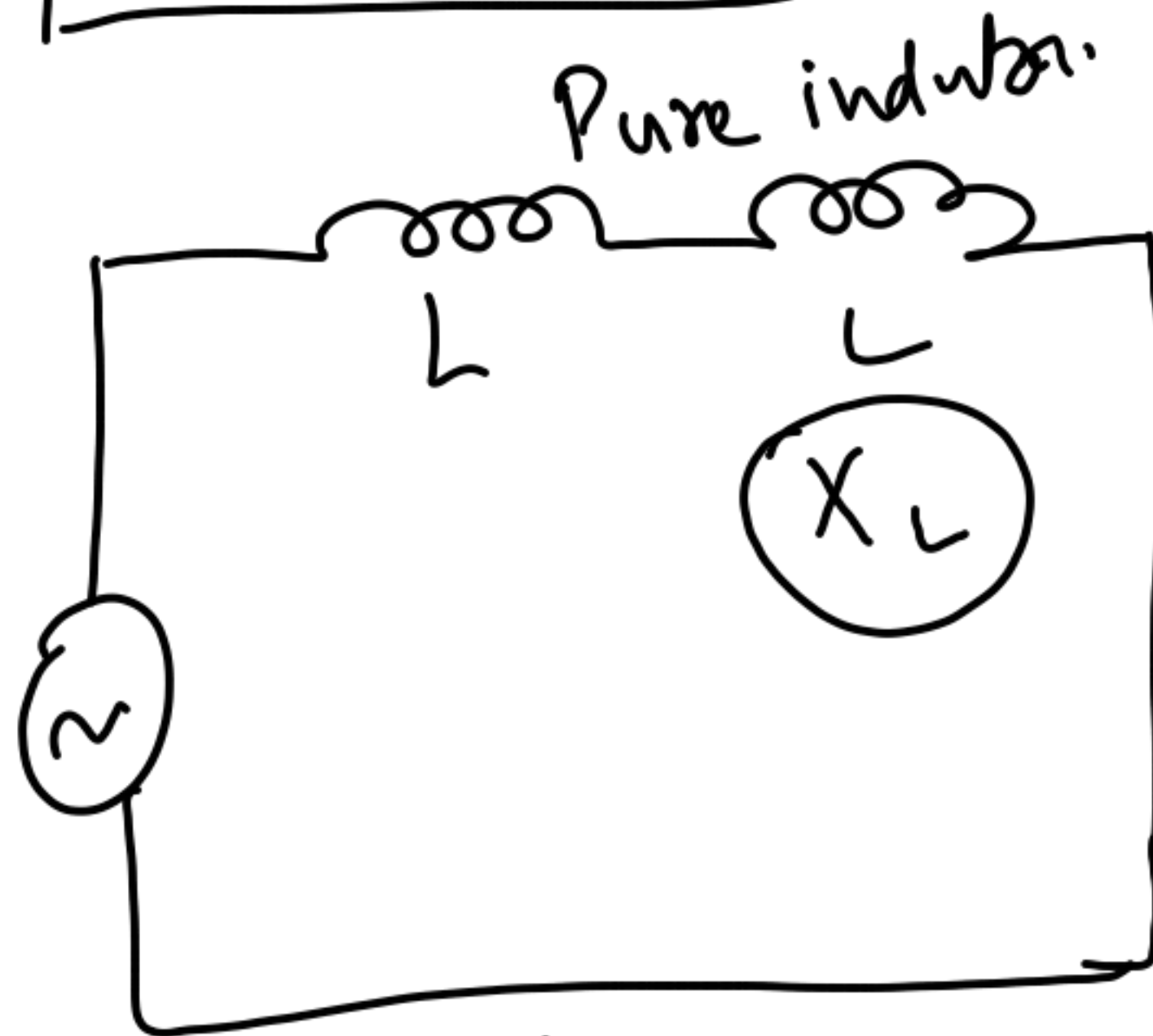
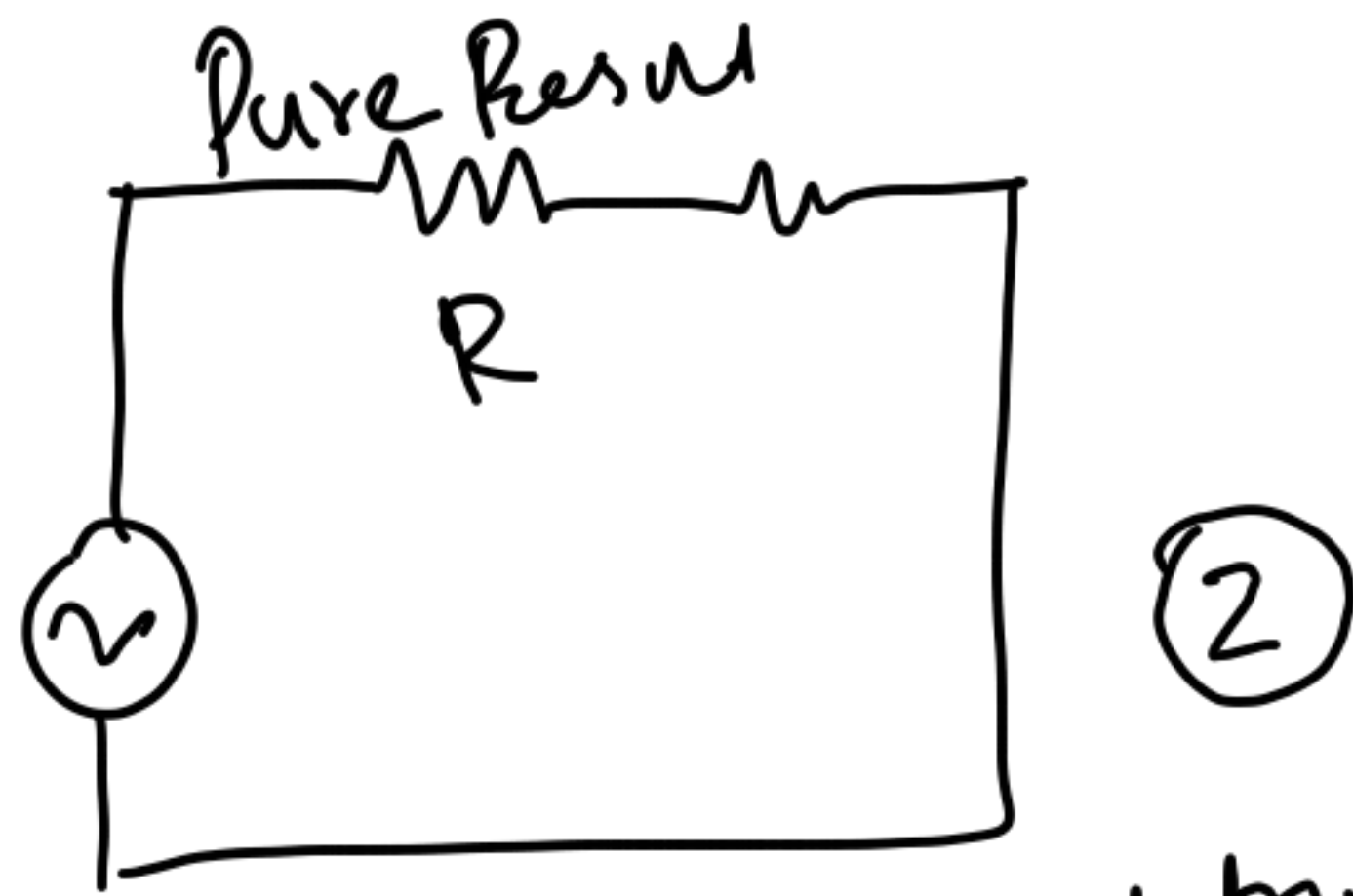
$$V_m = 50.02 \text{ V.}$$

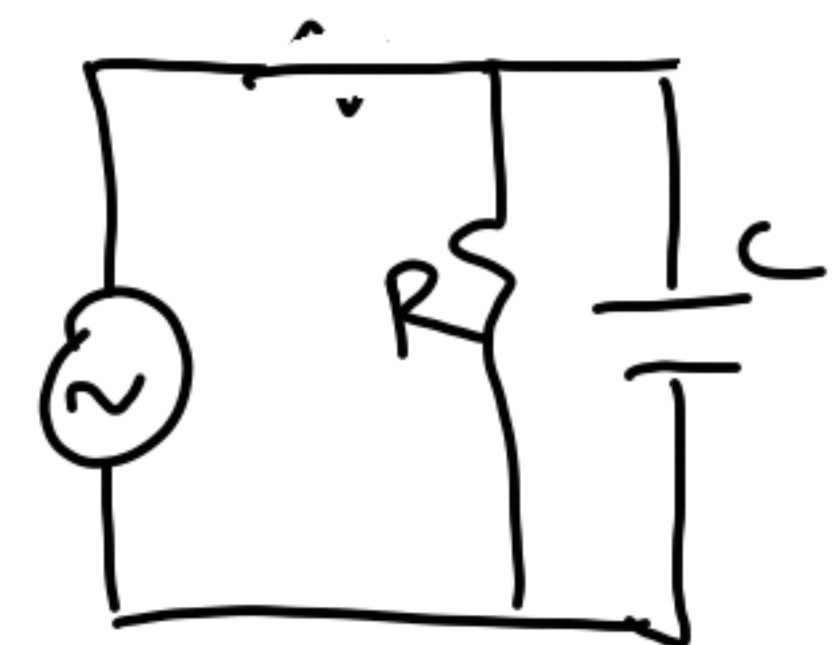
$$V = 50.02 \sin(\omega t + 0.97^\circ)$$

- Pure Resistor
- Pure inductor
- Pure Capacitor

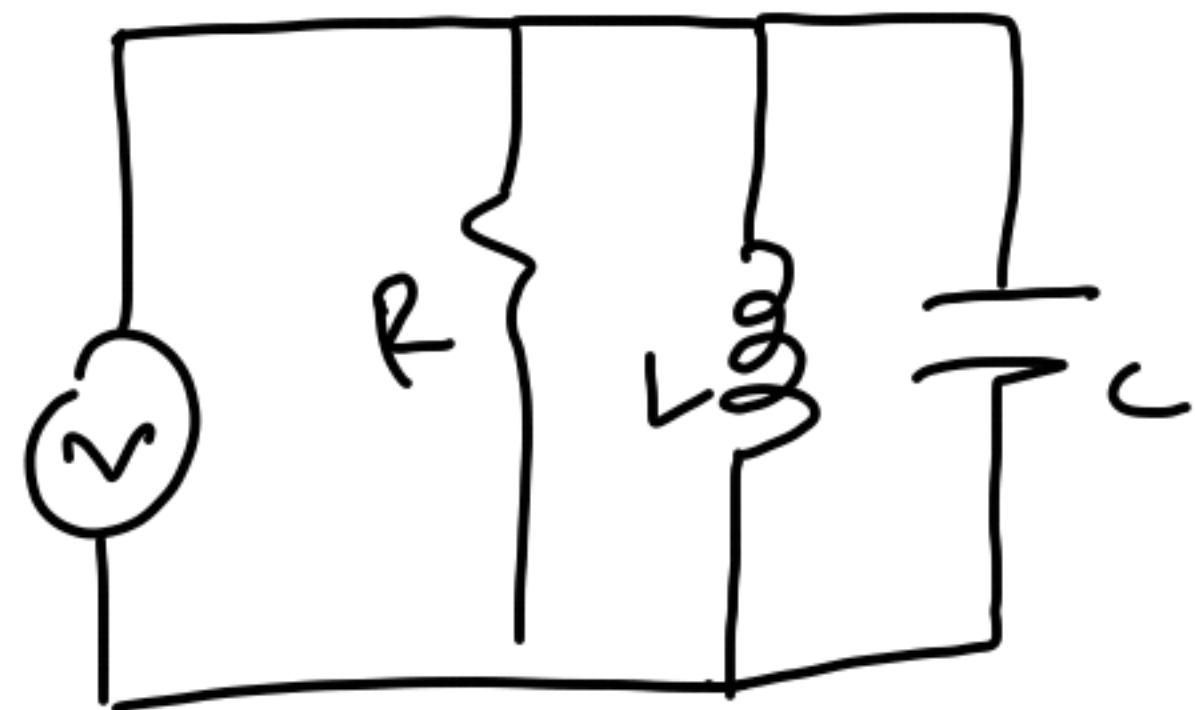
- RL Circuit
 - Series
 - Parallel
- RC Circuit
 - Series
 - Parallel
- RLC Circuit
 - series
 - parallel.

$1k\Omega$

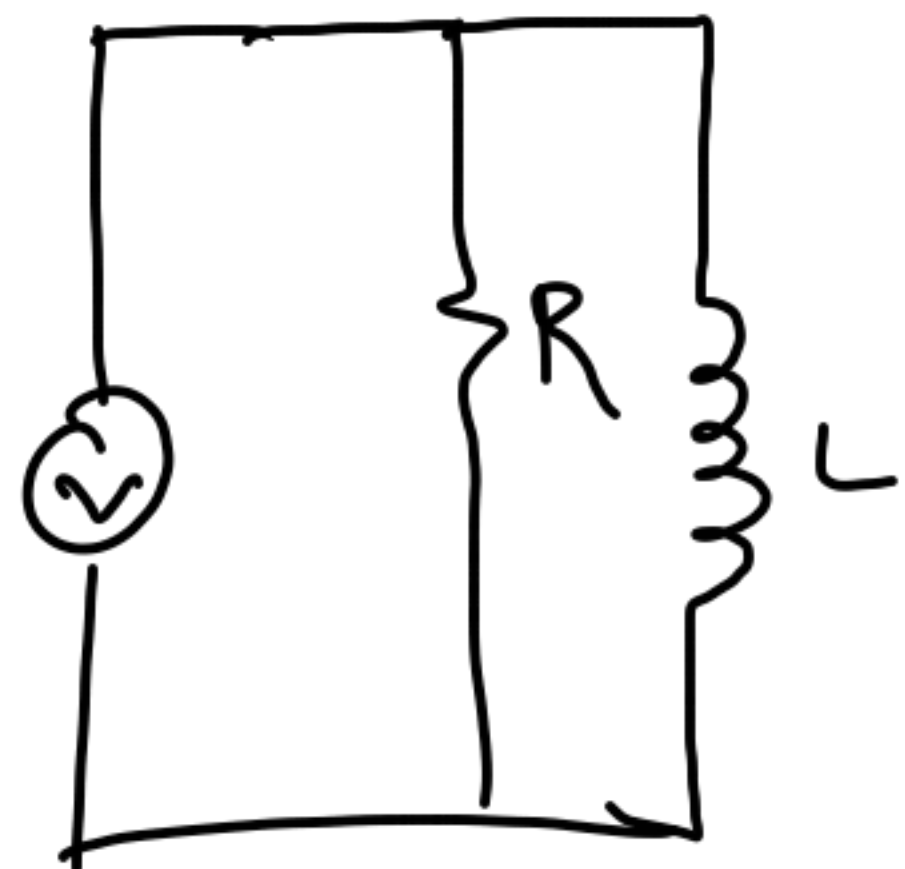




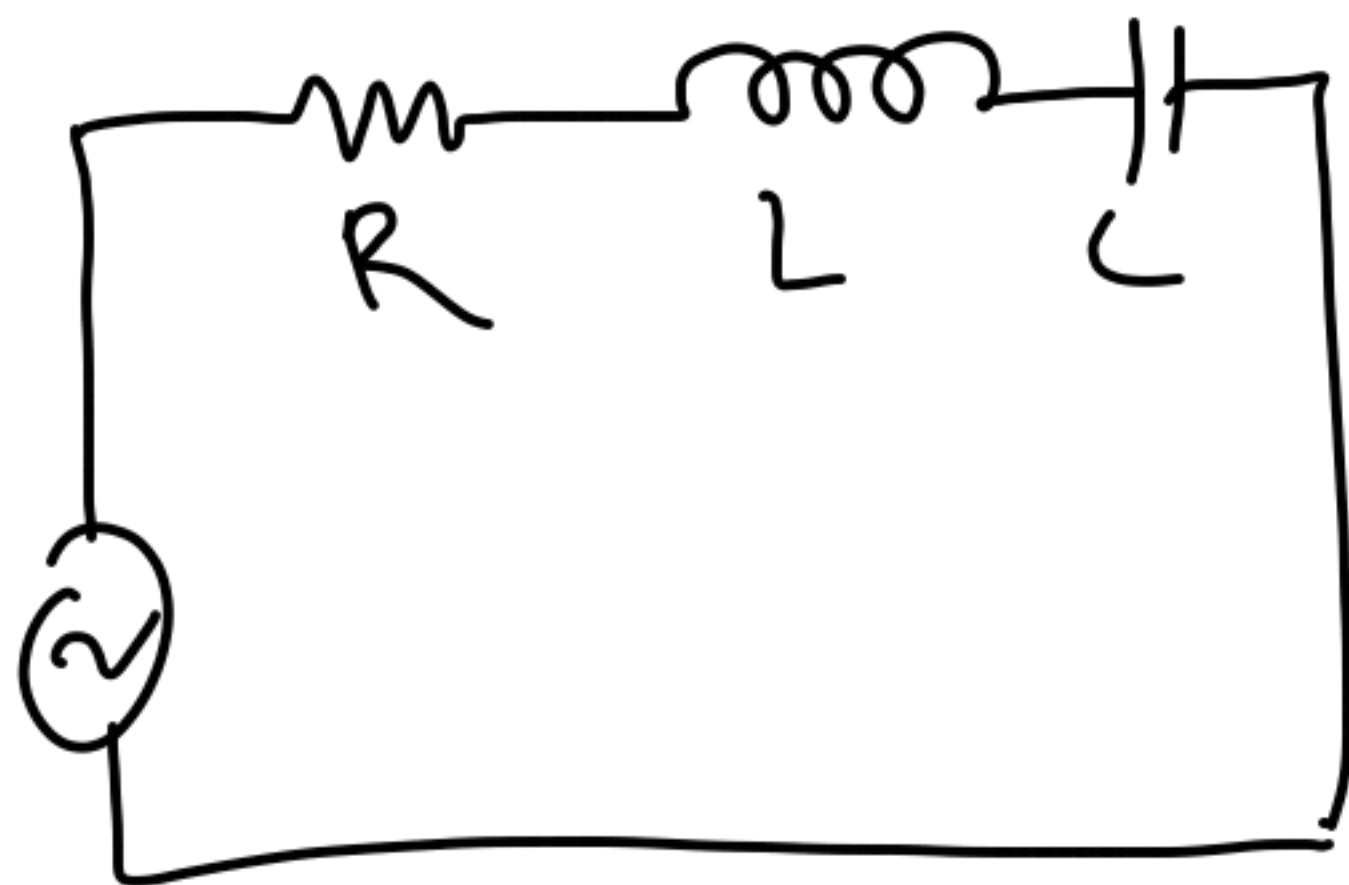
RC Parallel



RLC Parallel



RL Parallel



RLC Series

