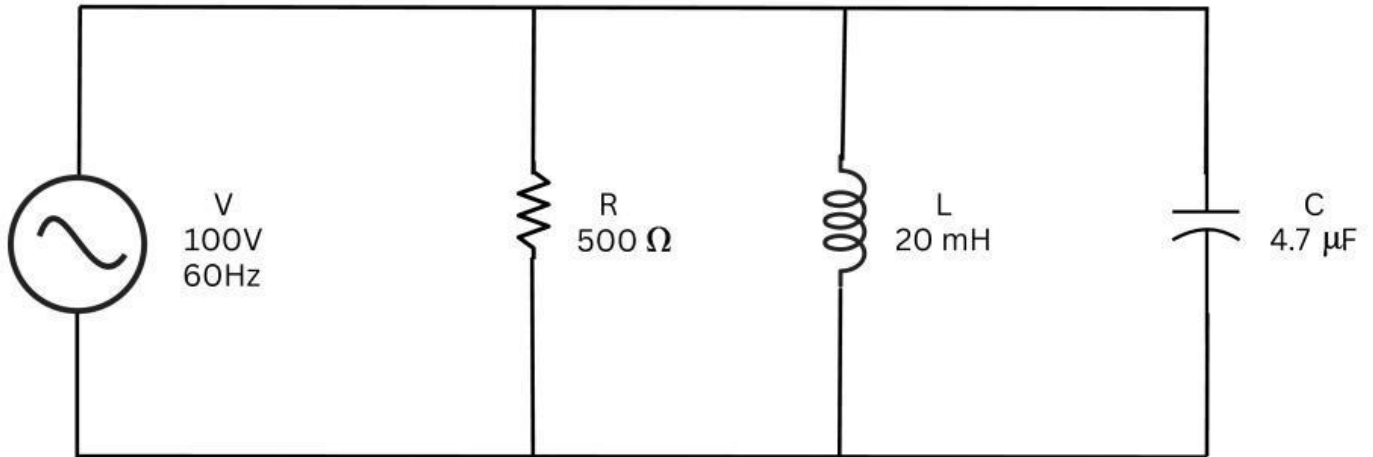


Assessment 7: RLC Parallel Circuit



A circuit consisting of a resistor of 500 Ω , capacitor of 4.7 μF and an inductor of 20mH are connected in parallel to a supply voltage of 100V, 60 Hz as circuit above. Calculate the following: -

1. The current in the resistor, I_R (2m)
2. The current in the coil, I_L (3 m)
3. The current in the capacitor, I_C (3 m)
4. The supply current, I_T (4 m)
5. The total impedance, Z_T (2 m)
6. The power consumed (2 m)
7. The power factor (4 m)

SOLUTION:

The capacitive reactance

$$X_C = \frac{1}{2 \pi f C}$$

$$= \frac{\boxed{}}{\boxed{} \times \boxed{} \times \boxed{} \times \boxed{} \times \boxed{} \times \boxed{}}$$

$$= \boxed{} \Omega$$

The inductive reactance

$$\begin{aligned}
 X_L &= 2 \pi f L \\
 &= \square \times \square \times \square \times \square \times \square \square \\
 &= \square \Omega
 \end{aligned}$$

The current flowing in the resistor

$$\begin{aligned}
 I_R &= \frac{\square V \angle \square^\circ}{\square R \angle \square^\circ} \\
 &= \frac{\square \angle \square^\circ}{\square \angle \square^\circ} \\
 &= \square \angle \square^\circ \text{ A}
 \end{aligned}$$

The current flowing in the inductor

$$\begin{aligned}
 I_L &= \frac{\square V \angle \square^\circ}{\square X_L \angle \square^\circ} \\
 &= \frac{\square \angle \square^\circ}{\square \angle \square^\circ} \\
 &= \square \angle \square^\circ \text{ A}
 \end{aligned}$$

The current flowing in the capacitor

$$\begin{aligned}
 I_C &= \frac{V \angle \theta^\circ}{X_C \angle \theta^\circ} \\
 &= \frac{\square \angle \square^\circ}{\square \angle \square^\circ} \\
 &= \square \angle \square^\circ \text{ A}
 \end{aligned}$$

The supply current

$$\begin{aligned}
 I_T &= I_R \angle \theta^\circ + I_L \angle \theta^\circ + I_C \angle \theta^\circ \\
 &= \square \angle \square^\circ + \square \angle \square^\circ + \square \angle \square^\circ \\
 &= (\square \square \square) + (\square \square \square) + (\square \square \square) \\
 &= \square \square \square \\
 &= \square \angle \square^\circ \text{ A}
 \end{aligned}$$

The total impedance

$$\begin{aligned}
 Z_T &= \frac{\boxed{V} \angle \boxed{\theta}^\circ}{\boxed{I_T} \angle \boxed{\theta}^\circ} \\
 &= \frac{\boxed{} \angle \boxed{}^\circ}{\boxed{} \angle \boxed{}^\circ} \\
 &= \boxed{} \boxed{} \boxed{} \\
 &= \boxed{} \angle \boxed{}^\circ \quad \Omega
 \end{aligned}$$

The phase angle,

$$\theta = \boxed{}^\circ$$

The true power

$$\begin{aligned} P &= \boxed{V} \times \boxed{I} \times \boxed{\cos} \boxed{\theta}^{\circ} \\ &= \boxed{} \times \boxed{} \times \boxed{} \boxed{}^{\circ} \\ &= \boxed{} \text{ W} \end{aligned}$$

The apparent power

$$\begin{aligned} S &= \boxed{V} \times \boxed{I} \\ &= \boxed{} \times \boxed{} \\ &= \boxed{} \text{ VA} \end{aligned}$$

The power factor

$$\begin{aligned} P_f &= \frac{\boxed{P}}{\boxed{S}} \\ &= \frac{\boxed{}}{\boxed{}} \\ &= \boxed{} \end{aligned}$$