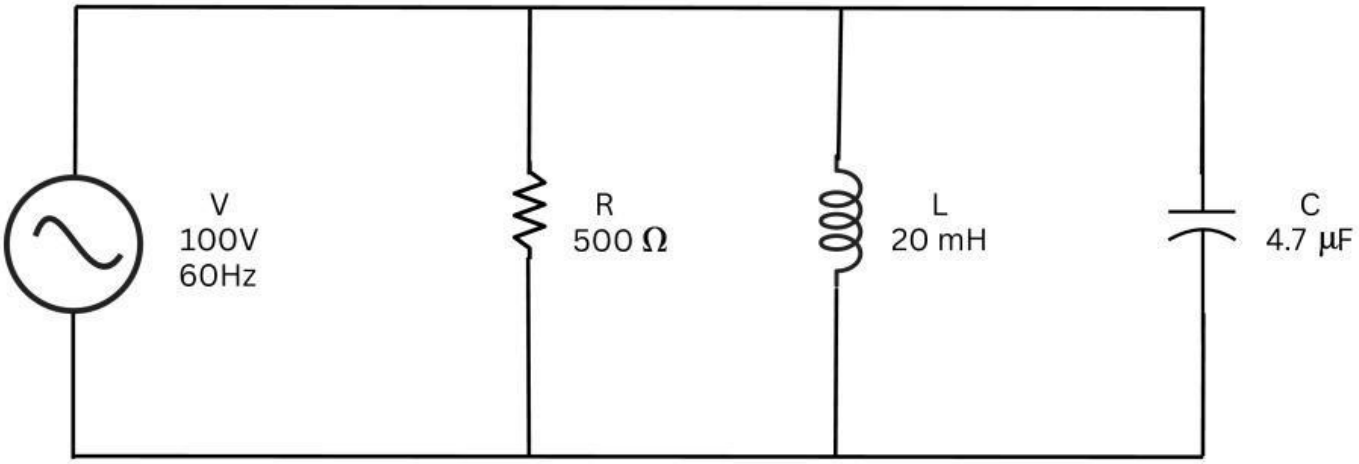
Assessment 7: RLC Parallel Circuit



A circuit consisting of a resistor of 500Ω, capacitor of 4.7uF 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, IR (2m)
2. The current in the coil, Il (3 m)
3. The current in the capacitor, IC (3 m)
4. The supply current, IT (4 m)
5. The total impedance, ZT (2 m)
6. The power consumed (2 m)
7. The power factor (4 m)

SOLUTION:

The capacitive reactance

$$X_C = \frac{1}{2\pi fC}$$

$$= \frac{\square}{\square \times \square \times \square \times \square \times \square}$$

$$= \square\ \Omega$$

The inductive reactance

$$X_L = 2\pi fL$$

$$= \square \times \square \times \square \times \square \times \square^{\square}$$

$$= \square\ \Omega$$

The current flowing in the resistor

$$I_R = \frac{V \angle \theta^{\circ}}{R \angle \theta^{\circ}}$$

$$= \frac{\square \angle \square^{\circ}}{\square \angle \square^{\circ}}$$

$$= \square \angle \square^{\circ}\ A$$

The current flowing in the inductor

$$I_L = \frac{V \angle \theta^{\circ}}{X_L \angle \theta^{\circ}}$$

$$= \frac{\square \angle \square^{\circ}}{\square \angle \square^{\circ}}$$

$$= \square \angle \square^{\circ}\ A$$

The current flowing in the capacitor

$$I_C = \frac{V \angle \theta^{\circ}}{X_C \angle \theta^{\circ}}$$

$$= \frac{\square \angle \square^{\circ}}{\square \angle \square^{\circ}}$$

$$= \square \angle \square^{\circ} \quad A$$

The supply current

$$I_T = I_R \angle \theta^{\circ} + I_L \angle \theta^{\circ} + I_C \angle \theta^{\circ}$$

$$= \square \angle \square^{\circ} + \square \angle \square^{\circ} + \square \angle \square^{\circ}$$

$$= (\square \; \square \; \square) + (\square \; \square \; \square) + (\square \; \square \; \square)$$

$$= \square \; \square \; \square$$

$$= \square \angle \square^{\circ} \quad A$$

The total impedance

$$Z_T = \frac{V \angle \theta^{\circ}}{I_T \angle \theta^{\circ}}$$

$$= \frac{\square \angle \square^{\circ}}{\square \angle \square^{\circ}}$$

$$= \square \; \square \; \square$$

$$= \square \angle \square^{\circ} \; \Omega$$

The phase angle,

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

The true power

$P = V \times I \times \cos \theta^{o}$

$= \quad \times \quad \times \quad ^{o}$

$= \quad W$

The apparent power

$S = V \times I$

$= \quad \times$

$= \quad VA$

The power factor

$$P_f = \frac{P}{S}$$

$$= \frac{\quad}{\quad}$$

$=$