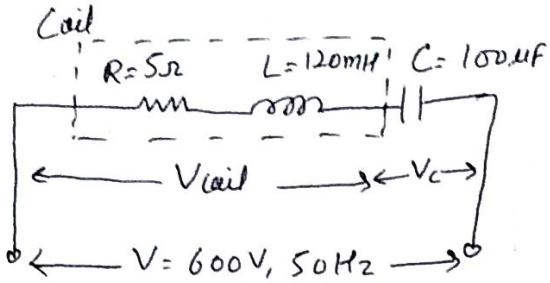
Ans 1.



(20 marks)

$$X_L = 2\pi f L = 2\pi (50)(120\times10^{-3}) = 37.7\,\Omega$$

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi (50)(100\times10^{-6})} = 31.83\,\Omega$$

Since $X_L > X_C$, circuit is Inductive

$$X_L - X_C = 37.7 - 31.83 = 5.87\,\Omega$$

Impedance $Z = \sqrt{R^2 + (X_L - X_C)^2}$

$$= \sqrt{(5)^2 + (5.87)^2} = 7.71\,\Omega$$

(a) Current, $I = \frac{V}{Z} = \frac{600}{7.71} = \boxed{77.82\ A}$ (5)

(b) Phase angle, $\phi = \tan^{-1}\left(\frac{X_L - X_C}{R}\right) = \tan^{-1}\left(\frac{5.87}{5}\right) = \boxed{49.58^\circ}$ (5)

(c) Impedance of coil, $Z_{coil} = \sqrt{R^2 + X_L^2} = \sqrt{(5)^2 + (37.7)^2} = 38.03\,\Omega$

Voltage across coil $V_{coil} = I Z_{coil}$

$$= (77.82)(38.03) = \boxed{2959.4\ V}$$ (5)

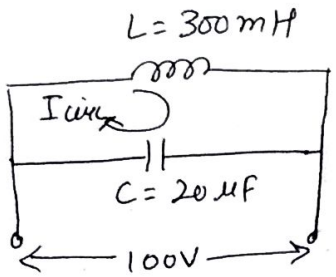
(d) Voltage across capacitor

$$V_C = IX_C$$

$$= (77.82)(31.83)$$

$$= \boxed{2477\ V}$$ (5)

Ans 2.



(10 marks)

(a) Parallel resonant frequency,

$$f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$$

However, resistance $R = 0$, hence

$$f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC}}$$

$$= \frac{1}{2\pi}\sqrt{\left(\frac{1}{(300\times10^{-3})(20\times10^{-6})}\right)}$$

$$= \frac{1}{2\pi}\sqrt{\frac{10^6}{(3)(2)}}$$

$$= \frac{10^3}{2\pi}\sqrt{\left(\frac{1}{6}\right)} = \boxed{64.97 \text{ Hz}}$$

(5)

(b) Current circulating in L & C at resonance,

$$I_{circ} = \frac{V}{X_C} = \frac{V}{\left(\frac{1}{2\pi f_r C}\right)} = 2\pi f_r C V$$

$$= 2\pi(64.97)(20\times10^{-6})(100)$$

$$= \boxed{0.816 \text{ A}}$$

(5)

OR

$$I_{circ} = \frac{V}{X_L} = \frac{V}{2\pi f_r L}$$

$$= \frac{100}{2\pi(64.97)(300\times10^{-3})} = \boxed{0.816 \text{ A}}$$