44. (a) The capacitive reactance is

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi(400\,\text{Hz})(24.0\times 10^{-6}\,\text{F})} = 16.6\ \Omega\ .$$

(b) The impedance is

$$\begin{aligned} Z &= \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{R^2 + (2\pi f L - X_C)^2} \\ &= \sqrt{(220\,\Omega)^2 + [2\pi(400\,\text{Hz})(150\times 10^{-3}\,\text{H}) - 16.6\,\Omega]^2} = 422\ \Omega\ . \end{aligned}$$

(c) The current amplitude is

$$I = \frac{\mathcal{E}_m}{Z} = \frac{220\,\text{V}}{422\,\Omega} = 0.521\ \text{A}\ .$$

(d) Now $X_C \propto C_{\text{eq}}^{-1}$. Thus, X_C increases as C_{eq} decreases.

(e) Now $C_{\text{eq}} = C/2$, and the new impedance is

$$Z = \sqrt{(220\,\Omega)^2 + [2\pi(400\,\text{Hz})(150\times 10^{-3}\,\text{H}) - 2(16.6\,\Omega)]^2} = 408\,\Omega < 422\,\Omega\ .$$

Therefore, the impedance decreases.

(f) Since $I \propto Z^{-1}$, it increases.