

Chapter 11, Solution 42.

(a) $S=120$, $pf = 0.707 = \cos \theta \longrightarrow \theta = 45^\circ$

$$S = S \cos \theta + jS \sin \theta = \underline{84.84 + j84.84 \text{ VA}}$$

(b) $S = V_{rms} I_{rms} \longrightarrow I_{rms} = \frac{S}{V_{rms}} = \frac{120}{110} = \underline{1.091 \text{ A rms}}$

(c) $S = I_{rms}^2 Z \longrightarrow Z = \frac{S}{I_{rms}^2} = \underline{71.278 + j71.278 \Omega}$

(d) If $Z = R + j\omega L$, then $R = \mathbf{71.278 \Omega}$

$$\omega L = 2\pi fL = 71.278 \longrightarrow L = \frac{71.278}{2\pi \times 60} = \underline{0.1891 \text{ H}} = \mathbf{189.1 \text{ mH}}.$$