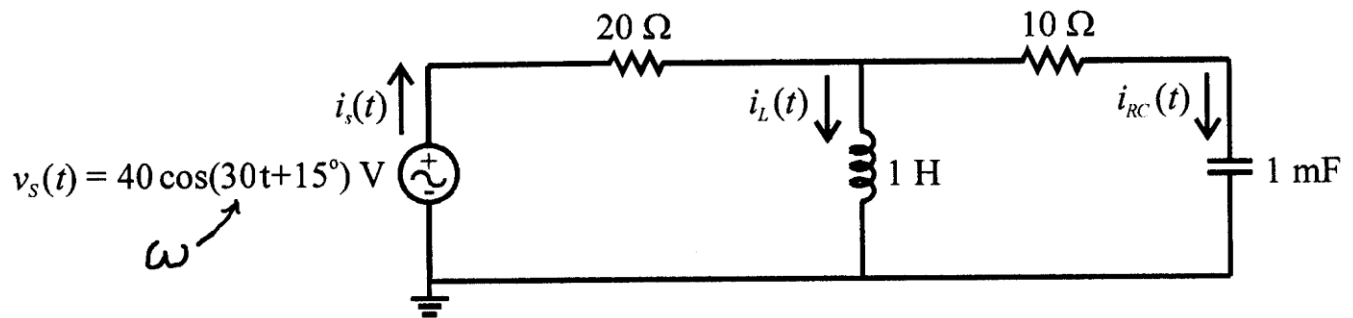
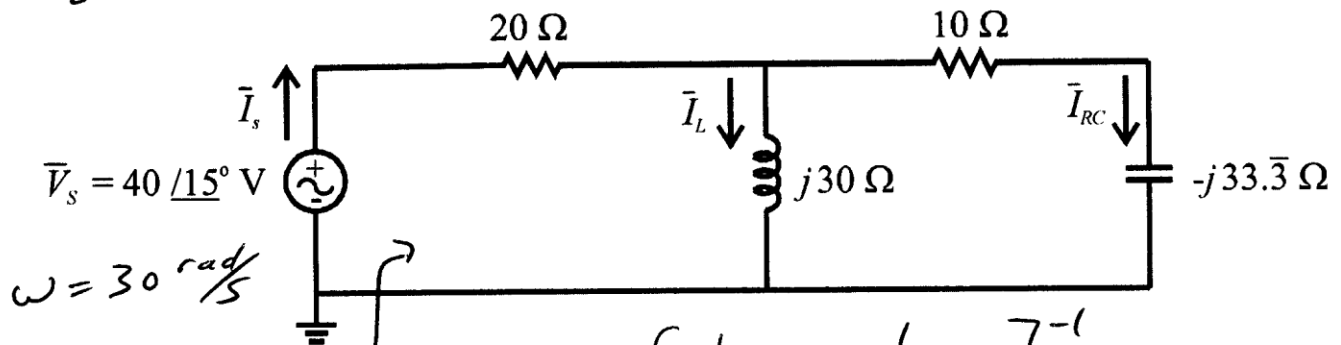


Example- Determine the time-average real power of all the components in the circuit.



Determine phasor equivalent circuit.

$$\bar{Z}_L = j\omega L = j30(1) = j30 \Omega \quad \bar{Z}_C = \frac{1}{j\omega C} = \frac{1}{j30(10^{-3})} = -j33.3 \Omega$$



$$\bar{Z}_{eq} = 20 + \left[\frac{1}{j30} + \frac{1}{10 - j33.3} \right]^{-1} = 101 + j57 \Omega$$

$$\bar{I}_s = \frac{40 \angle 15^\circ}{101 + j57} = 0.3449 \angle -14.4385^\circ \text{ A}$$

$$P_{ave, source} = \frac{1}{2} \operatorname{Re} \{ \bar{V}_s \bar{I}_s^* \} = \frac{1}{2} \operatorname{Re} \{ (40 \angle 15^\circ) (0.3449 \angle +14.4385^\circ) \}$$

$$= \frac{1}{2} \operatorname{Re} \{ 12.0147 + j6.7806 \} = \underline{\underline{6.0074 \text{ W}}} \text{ (supplied)}$$

$$P_{20} = \frac{1}{2} |\bar{I}_s|^2 (20) = \frac{1}{2} (0.3449)^2 (20) = \underline{\underline{1.1896 \text{ W}}} \text{ (absorbed)}$$

$$\bar{I}_{RC} = \bar{I}_s \left(\frac{j30}{j30 + 10 - j33.3} \right) = 0.9816 \angle 93.99645^\circ \text{ A}$$

$$\bar{I}_L = \bar{I}_s - \bar{I}_{RC} = 1.1387 \angle -69.30431^\circ \text{ A}$$

$$P_{j30} = \frac{1}{2} |\bar{I}_L|^2 \operatorname{Re} \{ j30 \} = \underline{\underline{0}}$$

$$P_{-j33.3} = \frac{1}{2} |\bar{I}_{RC}|^2 \operatorname{Re} \{ -j33.3 \} = \underline{\underline{0}}$$

$$P_{10} = \frac{1}{2} |\bar{I}_{RC}|^2 (10) = \frac{1}{2} (0.9816)^2 (10) = \underline{\underline{4.8177 \text{ W}}}$$