Chapter 11, Solution 38.

For the power system in Fig. 11.67, find: (a) the average power, (b) the reactive power, (c) the power factor. Note that 220 V is an rms value.

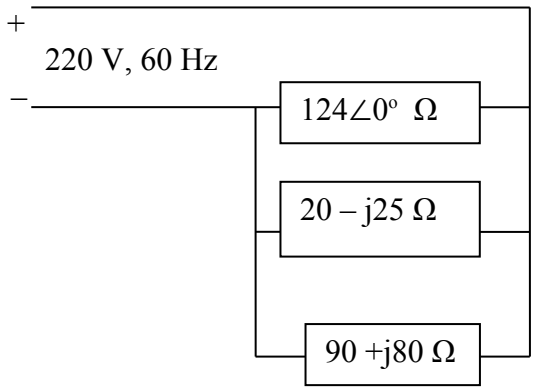

Figure 11.67
For Prob. 11.38.

Solution

$$S_1 = \frac{V^2}{Z_1^*} = \frac{220^2}{124} = 390.32$$

$$S_2 = \frac{V^2}{Z_2^*} = \frac{220^2}{20 + j25} = 944.4 - j1180.5$$

$$S_3 = \frac{V^2}{Z_3^*} = \frac{220^2}{90 - j80} = 300 + j267.03$$

$$S = S_1 + S_2 + S_3 = 1634.7 - j913.47 = 1872.6 < -29.196^\circ \text{ VA}$$

(a) P = Re(S) = **1634.7 W**

(b) Q = Im (S) = **913.47 VA (leading)**

(c) pf = cos (29.196°) = **0.8732**