

Chapter 11 Answers to Assigned Homework

2. (a) $p_C(1.5 \text{ ms}) = -0.4016 \text{ W}$

$$p_{500}(1.5 \text{ ms}) = 0.4016 \text{ W}$$

$$p_{v_s}(t) = 0$$

(b) $p_C(1.5 \text{ ms}) = 0.3883 \text{ W}$

$$p_{500}(1.5 \text{ ms}) = 0.1785 \text{ W}$$

$$p_{v_s}(1.5) = -0.5668$$

5. (a) $p_6(t) = 96e^{-33.333t} \text{ W}$, $p_C(t) = -96e^{-33.333t} \text{ W}$

(b) $p_6(60 \text{ ms}) = 12.922 \text{ W}$

11. (a) $p_{RC}(t) = [0.729 + 1.1582 \cos(90t - 20.99^\circ)] \text{ W}$

(b) $P_{RC} = 729.04 \text{ mW}$

14. (Error in figure. Should be a 5 ohm resistor not a 5 ohm inductor.)

$$P_{5,abs} = 2129 \text{ W} \text{ , } P_{j7,abs} = 0 \text{ , } P_{-j3.1,abs} = 0$$

$$P_{79,sup} = 229.99 \text{ W}$$

$$P_{152,sup} = 1898.6 \text{ W}$$

16. (a) $Z_L = 214.2 \angle -17.82^\circ$.

(b) $P_L = 125 \text{ mW}$

19. (a) $P_{4.8} = 69.545 \text{ W}$, $P_{j1.92} = 0$, $P_8 = 35.969 \text{ W}$

$$P_{-j2} = 9.597 \text{ W}$$

$$P_{1.6I_x} = 95.92 \text{ W}$$

- (b) $Z_{Th} = 8.62 \angle 21.8^\circ$
20. (a) Top Waveform: $\langle i \rangle = -1/3 \text{ A}$
Bottom Waveform: $\langle i \rangle = 5/8 \text{ A}$
- (b) Top Waveform: $\langle i^2 \rangle = 5/3 \text{ A}^2$
Bottom Waveform: $\langle i^2 \rangle = 2.0833 \text{ A}^2$
22. (a) $V_{eff} = 4.9497 \text{ V}$
- (b) $I_{eff} = 70.71 \text{ mA}$
- (c) $V_{eff} = 120 \text{ V}$
- (d) $I_{eff} = 50 \text{ A}$
24. (a) $I_{eff} = 2.1213 \text{ A}$
- (b) $V_{eff} = 2 \text{ V}$
- (c) $I_{eff} = 2.1213 \text{ mA}$
- (d) $I_{eff} = 2.3025 \text{ mA}$
25. (a) Fundamental frequency is 1/6 Hz. Period is 6 seconds. $I_{rms} = 1.291 \text{ A}$
- (b) Fundamental frequency is 1/4 ms = 250 Hz. Period is 4 ms.
 $I_{rms} = 1.4434 \text{ A}$
31. (a) $P_{Z_1} = 139.83 \text{ W}$ $P_{Z_2} = 259.1 \text{ W}$ $P_s = 408.39 \text{ VA}$
 $PF = 0.9768$
- (b) $P_{Z_1} = 435.72 \text{ W}$ $P_{Z_2} = 1307.2 \text{ W}$ $P_s = 1756.5 \text{ VA}$
 $PF = 0.9923$
- (c) $P_{Z_1} = 16.296 \text{ W}$ $P_{Z_2} = 0 \text{ W}$ $P_s = 82.14 \text{ VA}$ $PF = 0.1984$

34. (a) $V = 240\angle 243^\circ$ Vrms and $I = 3\angle 9^\circ$ Arms
Voltage lags current by 126° .
- (b) Current lags the voltage by 56.63°
- (c) Current leads the voltage by 46.76°
- (d) $PF = 0.2 \Rightarrow$ Current leads voltage by 78.46°
37. (a) $PF = 1.00$
- (b) $PF = 0.9523$ lagging
- (c) $PF = 0.9983$ leading
39. (a) $P_A = 3447.9$ VA , $P_B = 1479.8$ VA , $P_C = 87.864$ VA , $P_D = 147.051$ VA
, $PF = 0.9657$
- (b) $P_A = 9876.6$ VA , $P_B = 3856.1$ VA , $P_C = 227.08$ VA , $P_D = 406.21$ VA
, $PF = 0.988$
40. (a) $S = 133.33\angle 41.41^\circ$ VA
- (b) $S = 1235.48\angle 2.945^\circ$ VA
- (c) $S = 1000.05\angle -0.573^\circ$ VA
- (d) $S = 450\angle 49.458^\circ$ VA
44. $S_{1000} = 4.344\angle 0^\circ$ VA
- $S_{-j5} = 868.83\angle -90^\circ$ VA
- $S_{j10} = 102.46\angle 90^\circ$ VA
- $S_{18(\text{with } j10)} = 184.42\angle 0^\circ$ VA
- $S_{18} = 2581.1\angle 0^\circ$ VA
- $PF = 0.964$
- $S_{\text{source}} = 2874\angle -15.47^\circ$

45. $C = 360.85439 \mu\text{F}$.

47. $\mathbf{S}_{j30} = 88.4427 \angle 90^\circ \text{ VA}$

$$\mathbf{S}_{10} = 20.048 \angle 0^\circ \text{ VA}$$

$$\mathbf{S}_{-j25} = 5.895 \angle -90^\circ \text{ VA}$$

$$\mathbf{S}_{15} = 3.5375 \angle 0^\circ \text{ VA}$$

52. (a) 0.8989 lagging.

(b) $P_{50} = 625 \text{ VA}$ (apparent power)

$$P_{80} = 360 \text{ VA (apparent power)}$$

$$P_{j60} = 480 \text{ VA (apparent power)}$$

(c) $P = 985.02 \text{ W}$

(d) $V_{Th} = 240 \angle 53.13^\circ$

$$Z_{Th} = 48 \angle 53.13^\circ$$

$$I_{100} = 1.7857 \angle 36.53^\circ$$

$$P = 159.44 \text{ W} .$$