P05. $R = 4\ \text{M}\Omega$, $C = 5.0\ \mu\text{F}$, $V0 = 9.0$ V: (**a**) $\tau = RC = 20.0$ s; (**b**) $q/q_0 = 1-\exp(-t/\tau) = 2/3 \Rightarrow t = \tau \ln 3.00 = 22.0$ s; (**c**) $q = 2q_0/3 = 2CV/3 = 30.0\ \mu$C; (d) $I_{av} = \Delta q/\Delta t = 30.0/22.0 = 1.36\ (\mu\text{A})$.

P06. $R = 62\ \text{k}\Omega$, $C = 20.0\ \mu\text{F}$, $V_0 = 12.0$ V: (**a**) $\tau = RC = 1.24$ s; (**b**) $t = 0.8$ s, $V_c = V_0\exp(-t/\tau) = 6.29$ V; (**c**) $V_c = 9.0$ V, $q = CV_c = 180\ \mu$C; (**d**) $I_{av} = \Delta q/\Delta t = (20.0)(3.0)/22.0 = 75\ (\mu\text{A})$.

P09. $I_0 = \sqrt{2}\, I = \sqrt{2}\,(0.400) = 0.566$ (A); $V_0 = \sqrt{2}\, V = \sqrt{2}\,(110) = 156$ (V).

P14. $P_{\text{tot}} = 2(120) + 90 = 330$ (W). $I_{\text{tot}} = P_{\text{tot}}/V = 330/110 = 3.00$ (A). $I_{120} = 120/110 = 1.09$ (A). $R_{120} = V^2/P = 110^2/120 = 101\ (\Omega)$. $I_{90} = 90/110 = 0.818$ (A). $R_{90} = V^2/P = 110^2/90 = 134\ (\Omega)$.

P15. $R = 40\ \Omega$ & $i_0 = 4$ A $\Rightarrow P = i_0^2R/2 = 320$ W .

P20. (**a**) $I = V/R = 3.67$ A; (**b**) $I = 3.67$ A; (**c**) $P = VI = 403$ W .

P23. $X_C = 221\ \Omega$, $I = V/X_C = 0.271$ A. For $f = 0.4$ MHz, $X_C = 0.133\ \Omega$ and $I = 452$ A .

P28. (**a**) $P = 0$; (**b**) $I = V_c(2\pi fC) = 0.553$ A; (**c**) $q_0 = (\sqrt{2}\, V)C = 2.49$ mC .

P31. $X_L = 2\pi fL$: (**a**) $X_L = 1.51\ \Omega$; (**b**) $X_L = 15.1\ \Omega$.

P35. (**a**) $X_L = V/I = 2\pi fL$, $L = 36.5$ mH; (**b**) $I \propto 1/f$, $f = 120$ Hz .

P36. (**a**) $X_L = (\text{V}/\sqrt{2}\,)/I = 2\pi fL$, $f = 42.2$ Hz; (**b**) $I \propto 1/f$, $I = 0.8/3 = 0.266$ (A).

P41. $V_R = V_C \Rightarrow R = 1/2\pi fC$ or $f = 1/2\pi RC = 531$ Hz .

P48. (**a**) $X_C = 884\ \Omega$, $X_L = 0.226\ \Omega$, $Z = 1140\ \Omega$, $I = V/Z = 96.5$ mA; (**b**) $X_C = 8.84\ \Omega$, $X_L = 22.6\ \Omega$, $Z = 720\ \Omega$, $I = V/Z = 153$ mA .

P51. (**a**) $X_C = 221\ \Omega$, $X_L = 90.5\ \Omega$, $Z = 140\ \Omega$, $\phi = \tan^{-1}(X_L - X_C)/R = -69°$; (**b**) $X_L < X_C$ or $\phi < 0$, the current leads the voltage .

P57. (**a**) $f_0 = 1/2\pi\sqrt{LC} \Rightarrow C = 17.6$ mF; (**b**) $L = 1.17$ H .

P59. (**a**) $f_0 = 1/2\pi\sqrt{LC} = 79.6$ Hz; (**b**) $X_L = X_C$, $Z = R = 1600\ \Omega$.

P60. $C = (1/2\pi f_0)^2/L = 1.89\ \mu$F .