chapter 31. 3, 23, 26, 30, 43, 47, 58

3. $C_{eq} = \sum C_i = 8.4 + 2.5 + 3.5 = 14.4\mu F = 1.44\times10^{-5} F$

$L_{eq} = \sum L_r = 12mH = 1.2\times10^{-2}H$

$\omega = \frac{1}{\sqrt{LC}} = 2405.63 \text{ rad/s}$ $f = \frac{\omega}{2\pi} \approx 383 Hz$.

(b). No change (c) ↓ (d) ↑ (e) 0. ↑

23. (a) $I = \frac{\mathcal{E}_m}{\sqrt{R^2+(X_L-X_C)^2}}$ $\phi = 42^\circ$ $\cos\phi = 0.743$

(b) leads the emf

(c) more capacity

(d). $Z = R$. so $\phi \neq 0^\circ$ so not in resonance

(e) Yes

(f) No (g). Yes. (h) $P_{ave} = \frac{\mathcal{E}_m^2}{2}\cos\phi = 21.2W$.

26. $\tan\phi = \frac{X_L - X_C}{R} = \tan(-25^\circ)$.

$\tan 20^\circ = \frac{X_L - X_C}{R}$ $I = \frac{\mathcal{E}_m}{X_L - X_C}$ $X_L - X_C = \frac{\mathcal{E}_m}{I}$.

$R = \frac{\mathcal{E}_m}{I\tan 20^\circ} = 73.8\Omega$ $X_L = 2\pi f_d L = \omega_d \cdot L$

$C = 43.3\mu F$ $L = 234mH$

30. (a) $I = \frac{\mathcal{E}_m}{Z} = \frac{\mathcal{E}_m}{\sqrt{R^2+(X_L-X_C)^2}}$

(b) $V_R = V_C$ $\omega_d = \frac{1}{CR}$ $f_d = \frac{\omega_d}{2\pi} \approx 114 Hz$

(c) $\tan\phi = -45^\circ$ (d) $\omega_d = 716 \text{ rad/s}$ (e) $I = \frac{\mathcal{E}_m}{\sqrt{2}R} = 170mA$

(a)

$$u=\frac{Li^2}{2}+\frac{q^2}{2C}=\frac{4I^2}{2}$$

$$L=2.54\times10^{-2}H \qquad C=2.89\times10^{-6}F$$

$$\therefore u=3.56\mu J$$

(b) $Q=\sqrt{2Cu}=0.53\mu C$ (c) $I=\sqrt{\frac{2u}{L}}=1.49\times10^{-2}A$

(d) $\frac{q}{Q}=\cos\varphi$ $\varphi\approx\pm33^\circ$ $\varphi=-33^\circ$

(e) $\varphi=+33.1^\circ$

49. (a) $\omega=\frac{1}{\sqrt{LC}}$ $f=\frac{1}{2\pi\sqrt{LC}}\approx123Hz$

(b) $I=\omega Q$ $I=\sqrt{\frac{C}{L}}\cdot\mathcal{E}=81mA$

58 (a) $X_L=X_C$ $\omega dL=\frac{1}{\omega dC}$

$$C=\frac{1}{\omega dL}=3.56\times10^{-6}F\approx3.6\mu F$$

(b) $I_{max}=\frac{\mathcal{E}_m}{R}$ $\therefore R=1.5\Omega$