1. (1) $Z = \omega L = 2\pi f L$　　　$Z = \frac{1}{\omega C}$

$Z_1 = 2\pi \times 50 \times 10 \times 10^{-3}$

$Z_2 = 2\pi \times 60 \times 10 \times 10^{-6}$

$Z_3 = 2\pi \times 600 \times 10 \times 10^{-4}$

(2) $Z_1 = \frac{1}{2\pi \times 50 \times 10 \times 10^{-4}}$

$Z_2 = \frac{1}{2\pi \times 60 \times 10 \times 10^{-6}}$

$Z_3 = \frac{1}{2\pi \times 600 \times 10 \times 10^{-6}}$

(3) $L = \frac{Z}{2\pi f} = \frac{10}{2\pi \times \omega}$

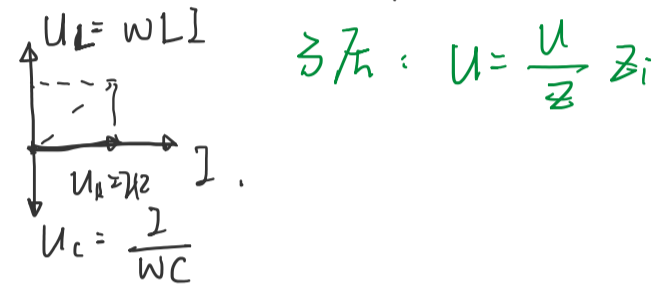$C = \frac{1}{2\pi f Z} = \frac{1}{2\pi \times 60 \times 10} =$

2. (1) $Z = 2\pi \times 50 \times 31.8 \times 10^{-3}$

$I = \frac{U}{Z} =$

(2) $Z = \frac{1}{2\pi \times 50 \times 79.6 \times 10^{-6}} =$

$I = \frac{U}{Z} =$

3. (1) $Z = \sqrt{R^2 + (\omega L - \frac{1}{\omega C})^2}$

$= \sqrt{1600 + (2\pi \times 50 \times 0.1 - \frac{1}{2\pi \times 50 \times 50 \times 10^{-6}})^2}$

$=$

(2) $\varphi = \operatorname{arctan} \frac{Z_L - Z_C}{R}$

$= \operatorname{arctan} \frac{2\pi \times 50 \times 0.1 - \frac{1}{2\pi \times 50 \times 500 \times 10^{-6}}}{40} =$

(3) $U(t) = U_m \cos(\omega t + \varphi)$

 另解：$U = \frac{U}{Z} Z_i$

$U_L = \omega L I$

$U_R = R I$

$U_C = \frac{1}{\omega C}$

4.

① $U_2 = \frac{U}{\omega L - \frac{1}{\omega C}} \times \frac{1}{\omega C} = \frac{1}{10} U$

$\frac{1}{\omega L \times \omega C} - 1 = \frac{1}{10}$

$4\pi^2 \times 1000 \times 100^2 \times L \times 10 \times 10^{-6} = 11$

3. (1) $Q = \frac{1}{R} \sqrt{\frac{L}{C}} = \frac{1}{40} \sqrt{\frac{0.1}{50 \times 10^{-6}}}$　　$\tan\varphi = \frac{\omega L \times 0.1 + (1 + 10 \times 20 \frac{1}{\omega C})}{40}$

(2) $Z = \sqrt{R^2 + (\omega C - \frac{1}{\omega L})^2} dr$　　共振阻 Z 最小 $\cos\varphi = 0.78$

$I = \frac{U}{Z} = \frac{\sqrt{2}V}{Z} =$

(3) 功率变大 $P = U I \cos\varphi = \frac{U^2}{Z} \cos\varphi =$

6. (1) $Z = \sqrt{R^2 + (\omega L - \frac{1}{\omega C})^2}$　　$\omega^2 LC = 1$

$Z_1 = \sqrt{300^2 + (500 \times 0.9 - \frac{1}{500 \times 2 \times 10^{-6}})^2}$　　$\frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{0.9 \times 2 \times 10^{-6}}}$

$Z_2 = \sqrt{300^2 + (1000 \times 0.9 - \frac{1}{1000 \times 2 \times 10^{-6}})^2}$　　$= \frac{1}{\sqrt{9 \times 10^{-6} \times 0.2}}$

$= \frac{1}{0.003 \sqrt{0.2}}$

$= 741.356$

(2) $Z_1 > Z_2$, $I_1 < I_2$

(3) $\varphi = \operatorname{arctan} \frac{Z_L - Z_C}{12}$

$= \operatorname{arctan} \frac{500 \times 0.9 - \frac{1}{500 \times 2 \times 10^{-6}}}{300}$

$= \operatorname{arctan} \frac{450 - 1000}{300} = \operatorname{arctan} -\frac{550}{300}$

(4) 共振时：$\omega = \frac{1}{\sqrt{LC}} = 745.356$ rad·s^{-1}

$\tan\varphi = \frac{Z_L - Z_C}{R} < 0, \cos\varphi = 1$

(5) 共振时电流不变。

$Z = R, I = \frac{U}{R\sqrt{2}} = \frac{50}{\sqrt{2} \times 300} = 0.154$ A.

7. 　　$U_R = U_L = U_C$

I_C

I_L　　$I_R = \frac{U}{R}$　　U

$Z = \frac{U}{I} = \frac{U}{\sqrt{I_R^2 + (I_L - I_C)^2}} = \frac{1}{\sqrt{R^2 + (\omega C - \frac{1}{\omega L})^2}}$
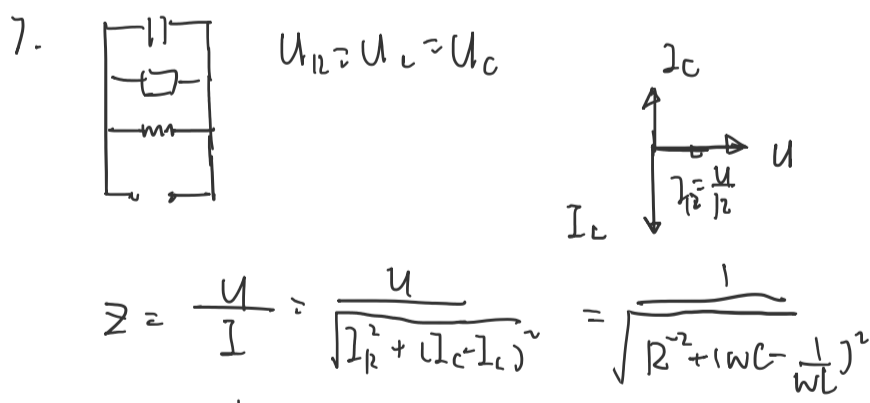
(1) $\omega = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{0.1 \times 10^{-2} \times 0.1}} = 10^4$ rad·s^{-1}

$f = \frac{\omega}{2\pi} = \frac{5000}{\pi} =$

(2) $Z = \frac{1}{\sqrt{(\frac{1}{100})^2}} = 100 \Omega$

$I = \frac{U}{Z} = 1$ A.

(3) $Z_R = R = 100 \Omega$　　$I_{mp} = \frac{U}{\sqrt{2}} = 1$ A.

$Z_L = \omega L = 10^4 \times 0.1 = 10^3 \Omega$　　振子流。

$Z_C = \frac{1}{\omega C} = \frac{1}{10^4 \times 1 \times 10^{-7}} = 10^3 \Omega$　　$I_{RL} = \frac{U}{\omega L} = 0.1$ A

$I_R = \frac{U}{R} I_L = I_L$　　$I_L + I_C + I_R = 1$, $I_R = \frac{10}{12} = \frac{5}{60}$ A.

(3) $I_L = \frac{1}{12} I = \frac{1}{6}$ A.

(4) $W_L = \frac{1}{2} L I^2 = \frac{1}{2} \times 0.1 \times [\frac{1}{36} \times 0.1^2 = 5 \times 10^{-4} J]$

$W_C = \frac{1}{2} C U^2 = \frac{1}{2} \times 0.1 \times 10^{-6} \times 100^2 = 5 \times 10^{-4} J$.

8. $\frac{n_1}{660} = \frac{6}{220}$, $n_1 = 18$

$\frac{n_2}{660} = \frac{6.8}{220}$, $n_2 = 20.4$

$\frac{n_3}{660} = \frac{350}{220}$, $n_3 = 1050$

$U_0 I_0 = U_1 I_1 + U_2 I_2 + U_3 I_3$.

9. $\frac{n_1}{1} = \frac{100}{0.5}$, $n_1 = 200$

$\frac{n_1}{n_2} = \frac{100}{3300}$, $n_2 = 6600$