2. $\Delta v = V_{max} \sin 2\pi f t$

$= 98 \cdot \sin 2\pi \cdot 40 t$

$V_{max} = 98\ V$

$f = 40\ Hz$

$I_{max} = 0.5\ A$

a) $V_{RMS} = \frac{V_{max}}{\sqrt{2}} = \frac{98}{\sqrt{2}} = 69.296\ V$

b) $f = 40\ Hz$

c) $\frac{1}{2\pi f C} = \frac{V_{max}}{I_{max}}$

$\frac{1}{80\pi C} = \frac{98}{0.5}$

$C = \frac{0.5}{98} \times \frac{1}{80\pi} = 2.03 \times 10^{-2}\ mF$

$= 0.203\ \mu F$

3. $\Delta v = 90 \sin 350 t$

$V_{max} = 90\ V$

$2\pi f = 350$

$f = 55.704\ Hz$

$R = 50\ \Omega$

$C = 25\ \mu F$

$L = 0.2\ H$

$X_C = \frac{1}{2\pi f C} = \frac{1}{350 \times 25 \times 10^{-6}} = \frac{800}{7} = 114.29\ \Omega$

$X_L = 2\pi f L = 350 \times 0.2 = 70\ \Omega$

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$= \sqrt{50^2 + (-44.3)^2}$

$= 66.79\ \Omega$

$$V_{RMS} = \frac{V_{max}}{\sqrt{2}} = \frac{90}{\sqrt{2}} = 63.64\ V$$

$$I_{RMS} = \frac{V_{RMS}}{Z} = \frac{90}{\sqrt{2}} \times \frac{1}{66.79}$$

$$= 0.953$$

$$P_{avg} = I_{rms} V_{rms} \cos\varphi$$

$$= 0.953 \times 63.64 \times \cos\left(\tan^{-1}\left(-\frac{44.3}{50}\right)\right)$$

$$= \underline{45.39\ W}$$

6. $R = 0.5\ \Omega$

$C = 613\ \mu F$

$f = 600\ Hz$

$$V = IR$$

$$= \frac{4 \times I}{4+L} \times 12$$

$$= \frac{12 \times 4 \times I}{6}$$

$$= 8I$$

$$\Delta V_{out} = \frac{R}{R + X_C} \times \Delta V_{in}$$

$$\frac{\Delta V_{out}}{\Delta V_{in}} = \frac{R}{R + X_C}$$

$$X_C = \frac{1}{2\pi f C} = 0.433$$

$$\frac{\Delta V_{out}}{\Delta in} = \frac{0.5}{0.933} = 0.536$$

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1. $\ell = 0.5\,mm = 5\times10^{-4}\,m$

$E = 7\times10^{5}\,V$

$$B = \frac{E}{C} = \frac{7\times10^{5}}{3\times10^{8}}$$

$$= 0.0023\,T$$

$$Intensity = \frac{E^2_{max}}{2\mu_0 c}$$

$$= \frac{(0.7\times10^{6})^2}{2\times4\pi\times10^{-7}\times3\times10^{8}}$$

$$= 243.706\times10^{6}\ W/m^2$$

$$= 243\ MW/m^2$$

$$P = IA$$

$$= 243.706\times10^{6}\times\pi\times(0.5\times10^{-3})^2$$

$$= 191.406\ W$$

3. $P = 25\times10^{-3}\ W$

$\ell = 1\,mm$

$$I = \frac{P}{A} = \frac{25\times10^{-3}}{\pi\times(1\times10^{-3})^2}$$

$$= 7957.75\ W/m^2$$

$P = IA = 7957.75$

Pressure $= \frac{2I}{C} = \frac{2 \times 1.95 \times 1.15}{3 \times 10^8}$

$= 53.05\ \mu N$