ΑΣΚΗΣΗ κεφ. 4ο

1

$f = ;$

$T = 0,001\,s$

$$f = \frac{1}{T} \Rightarrow f = \frac{1}{0,001} = \frac{1}{1 \cdot 10^{-3}} =$$

$$f = 10^3\,Hz \Rightarrow \boxed{f = 1000\,Hz}$$

2.

f_1, T_1

$f_2 = 2f_1$

$T_2 = ;$

$$\left.\begin{aligned} f_1 &= \frac{1}{T_1} \\ f_2 &= \frac{1}{T_2} \end{aligned}\right\} \begin{aligned} f_1 &= \frac{1}{T_1} \\ 2f_1 &= \frac{1}{T_2} \end{aligned} \Rightarrow \frac{f_1}{2f_1} = \frac{\frac{1}{T_1}}{\frac{1}{T_2}} \Rightarrow$$

$$\Rightarrow \frac{1}{2} = \frac{T_2}{T_1} \Rightarrow 2T_2 = T_1 \Rightarrow$$

$$\Rightarrow \boxed{T_2 = \frac{T_1}{2}}$$

3

$V_m = ;$

$V_{ev} = 220\,V$

$$V_{ev} = \frac{V_m}{\sqrt{2}} \Rightarrow V_m = V_{ev} \cdot \sqrt{2} \Rightarrow$$

$$V_m = V_{ev} \cdot 1,413 \Rightarrow$$

$$V_m = 220\,V \cdot 1,413 \Rightarrow$$

$$\boxed{V_m = 311\,V}$$

4

$U = 220V$

$I = 15A$

a) $\cos\phi = 0,8$

$P = ?$

b) $Z = ?$

a) $P = U \cdot I \cdot \cos\phi \Rightarrow$

$P = U \cdot I \cdot \cos\phi = 220V \cdot 15A \cdot 0,8 \Rightarrow$

$P = 3300 \cdot 0,8 \Rightarrow \boxed{P = 2640W}$

b) $I = \frac{U}{Z} \Rightarrow Z = \frac{U}{I} = \frac{220V}{15A}$

$\Rightarrow \boxed{Z = 14,67\Omega}$

5.

$U = 220V$

$I = 3A$

$P = 502W$

$\cos\phi = ?$

$P = U \cdot I \cdot \cos\phi \Rightarrow \cos\phi = \frac{P}{U \cdot I} \Rightarrow$

$\cos\phi = \frac{502}{220 \cdot 3} \Rightarrow \cos\phi = \frac{502}{660} \Rightarrow$

$\boxed{\cos\phi = 0,76}$

6.

$X_C = ?$

$C = 0,2\mu F = 0,2 \cdot 10^{-6} F$

a) $f_1 = 1KHz = 1 \cdot 10^3 Hz$

b) $f_2 = 10KHz = 10 \cdot 10^3 Hz$

a) $X_{C_1} = \frac{1}{2\pi f_1 \cdot C} \Rightarrow X_{C_1} = \frac{1}{2 \cdot 3,14 \cdot 1 \cdot 10^3}$

$\Rightarrow X_{C_1} = \frac{1}{2 \cdot 3,14 \cdot 1 \cdot 10^3 \cdot 0,2 \cdot 10^{-6}}$

$\Rightarrow X_{C_1} = \frac{1}{6,28 \cdot 10^{-3} \cdot 0,2} \Rightarrow$

$\Rightarrow X_{C_1} = \frac{10^3}{1,256} \Rightarrow \boxed{X_{C_1} = 796\Omega}$

b) $X_{C_2} = \frac{1}{2\pi f_2 \cdot C} \Rightarrow X_{C_2} = \frac{1}{2 \cdot 3,14 \cdot 10 \cdot 10^3 \cdot 0,2 \cdot 10^{-6}}$

$\Rightarrow X_{C_2} = \frac{1}{6,28 \cdot 10^{-2} \cdot 0,2} \Rightarrow X_{C_2} = \frac{10^2}{1,256} \Rightarrow$

$\Rightarrow \boxed{X_{C_2} = 79,6\,\Omega}$

7.

$U = 220\,V$

$f = 50\,Hz$

$I = 0,1\,A$

$(R = 0)$

a) $X_C = ;$

b) $C = ;$

a) $X_C = \frac{U}{I} \Rightarrow X_C = \frac{220\,V}{0,1\,A} \Rightarrow$

$\boxed{X_C = 2200\,\Omega}$

b) $X_C = \frac{1}{2\pi f \cdot C} \Rightarrow C = \frac{1}{2\pi f \cdot X_C}$

$\Rightarrow C = \frac{1}{2 \cdot 3,14 \cdot 50 \cdot 2200} \Rightarrow$

$\Rightarrow C = \frac{1}{314 \cdot 2200} \Rightarrow$

$\Rightarrow C = \frac{1}{690800} \Rightarrow \boxed{C = 1,47 \cdot 10^{-6}\,F \text{ ή } C = 1,47\,\mu F}$