

M. Hasyim Abdullah P.

1101191095 / TT-43-11

4.) Dik: $R = 8,7 \text{ k}\Omega = 8700 \Omega$

$$L = 20 \text{ mH} = 20 \times 10^{-3} \text{ H}$$

$$C = 6,25 \text{ nF} = 6,25 \times 10^{-9} \text{ F}$$

$$V_{\text{rms}} = 725 \text{ V}$$

$$f = 10 \text{ kHz} = 10.000 \text{ Hz}$$

Dit: a. $Z = \dots ?$

b. $I_{\text{rms}} = \dots ?$

c. $f_R = \dots ?$

d. X_L & $X_C = \dots ?$

e. $P = \dots ?$

f. $\phi = \dots ?$

Jawab:

a. $X_L = \omega L = 2\pi f \cdot L$

$$= 2\pi \cdot 10.000 \cdot 20 \times 10^{-3}$$

$$= 560\pi = 1750,4 \Omega$$

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = \frac{1}{2\pi \cdot 10.000 \cdot 6,25 \times 10^{-9}}$$

$$= 2546,5 \Omega$$

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

$$= \sqrt{8700^2 + (1750,4 - 2546,5)^2}$$

$$= 8735,62 \Omega$$

$$\begin{aligned}
 b. I_{rms} &= \frac{V_{rms}}{Z} \\
 &= \frac{728}{0735,62} \\
 &= 0,003 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 c. f_R &= \frac{1}{2\pi\sqrt{LC}} \\
 &= \frac{1}{2\pi\sqrt{20 \times 10^{-3} \cdot 6,25 \times 10^{-9}}} \\
 &= 12031 \text{ Hz}
 \end{aligned}$$

$$\begin{aligned}
 d. X_L &= \omega L = 2\pi fL \\
 &= 2\pi \cdot 12000 \cdot 20 \times 10^{-3} \\
 &= 1750,4 \Omega
 \end{aligned}$$

$$\begin{aligned}
 X_C &= \frac{1}{\omega C} = \frac{1}{2\pi fC} \\
 &= \frac{1}{2\pi \cdot 12000 \cdot 6,25 \times 10^{-9}} \\
 &= 2546,5 \Omega
 \end{aligned}$$

$$\begin{aligned}
 e. P &= I_{rms}^2 R \\
 &= 0,003^2 \cdot 0700 \\
 &= 59,93 \text{ W}
 \end{aligned}$$

$$\begin{aligned}
 f. \phi &= \tan^{-1}\left(\frac{X_L - X_C}{R}\right) \\
 &= \tan^{-1}\left(\frac{1750,4 - 2546,5}{0700}\right) \\
 &= -5,10^\circ \\
 &= 354,02^\circ
 \end{aligned}$$