Rafbók

A $\quad D_1 \quad$ a

N1:N2

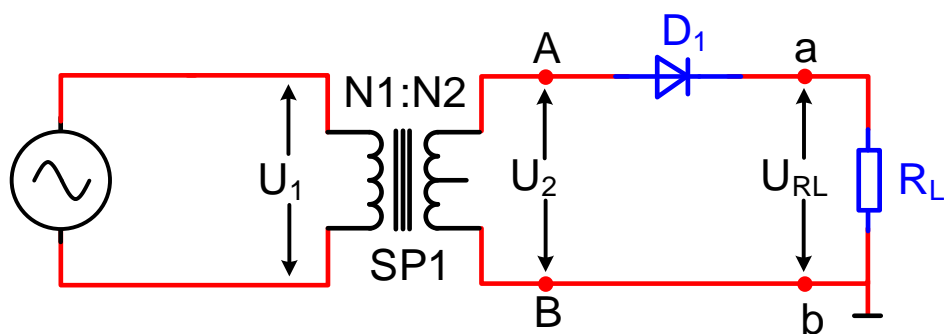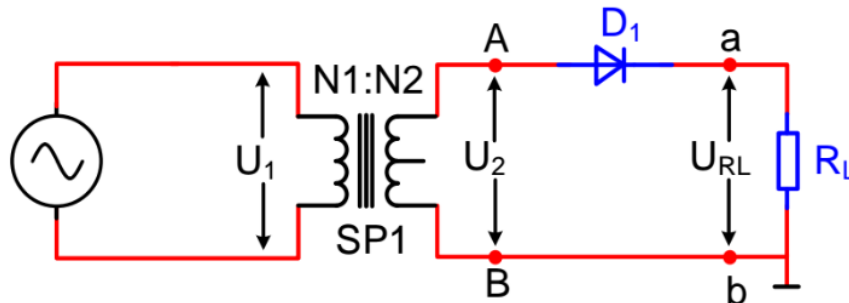$U_1 \qquad U_2 \qquad U_{RL} \qquad R_L$

SP1

B $\qquad$ b

RTM004
Hálfbylgjuafriðun
Svör og útreikningar

Dæmi 1.4 bls. 8 svör

1.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{5} \cdot 230V = 46V \Rightarrow$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \bullet 46V = 65V$$

$$U_{RL_t} = U_{2t} - 0.7V = 65V - 0,7 = 64,3V$$

$$U_{RL_{DC}} = \frac{U_{RL_t}}{\pi} = \frac{64,3V}{\pi} = 20,5V$$
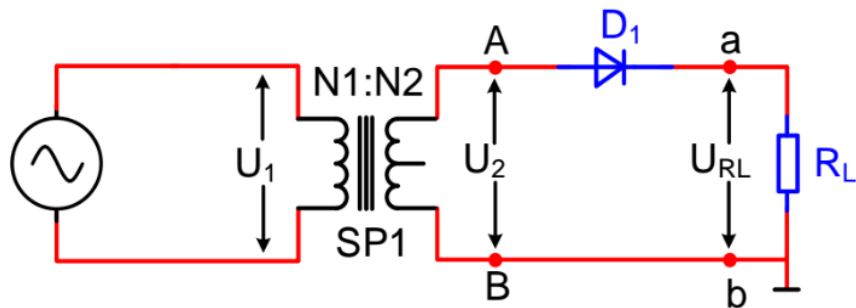
b)

$$U_{RL_{gára}} = 1,2 \cdot U_{RL_{DC}} = 1,2 \cdot 20,5V = 24,6V$$

c)

$$U_{PIV} > U_{2t} = 65V$$

2.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{10} \cdot 230V = 23V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \bullet 23V = 32,5V$$

$$U_{RL_{(t)}} = U_{2t} - 0,7V = 32,5V - 0,7V = 31,8V$$

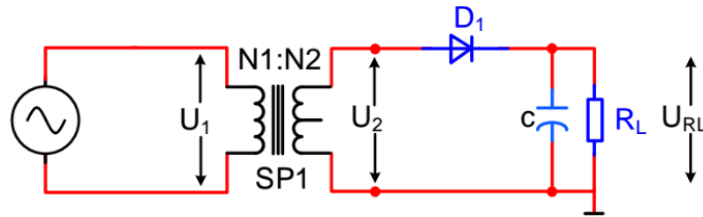$$U_{RL_{DC}} = \frac{U_{RL_{(t)}}}{\pi} = \frac{31,8V}{\pi} = 10,2V$$

b)

$$U_{RL_{gára}} = 1,2 \cdot U_{RL_{DC}} = 1,2 \cdot 10,2V = 12,2V$$

c)

$$U_{PIV} > U_{2t} = 32,5V$$

3.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{5} \cdot 230V = 46V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \bullet 46V = 65V$$

$$U_{RL_{(t)}} = U_{2t} - 0,7V = 65V - 0,7V = 64,3V$$

$$U_{RL_{DC}} = \frac{U_{RL_{(t)}}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{64,3V}{1 + \frac{1}{2 \cdot 50[hz] \cdot 470 \cdot 10^{-6}[uF] \cdot 1000[\Omega]}} = 63V$$

b)

$$U_{RLgára_{(t)}} = U_{RL_t} - U_{RL_{DC}} = 64.3V - 63V = 1,3V$$

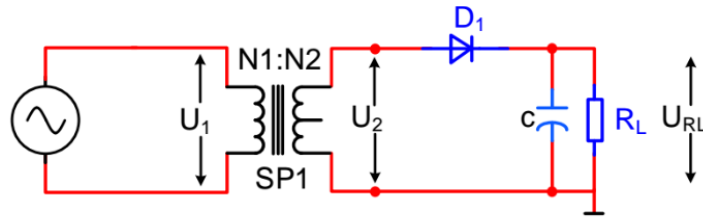$$U_{RLgára} = \frac{U_{RLgára_{(t)}}}{\sqrt{2}} = \frac{1,3V}{\sqrt{2}} = 0,93V$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,93V}{62,7V} \cdot 100 = 1,5\%$$

d)

$$U_{PIV} > 2 \cdot U_{2_t} = 2 \cdot 65V = 130V$$

4.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{10} \cdot 230V = 23V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \bullet 23V = 32,5V$$

$$U_{RL_{(t)}} = U_{2t} - 0,7V = 32,5V - 0,7V = 31,8V$$

$$U_{RL_{DC}} = \frac{U_{RL_{(t)}}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{31,8V}{1 + \frac{1}{2 \cdot 50[hz] \cdot 220 \cdot 10^{-6}[uF] \cdot 5000[\Omega]}} = 31,5V$$

b)

$$U_{RLgára_{(t)}} = U_{RL_t} - U_{RL_{DC}} = 31,8V - 31,5V = 1V$$

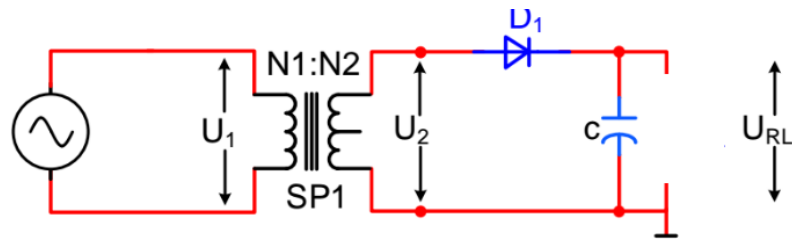$$U_{RLgára} = \frac{U_{RLgára_{(t)}}}{\sqrt{2}} = \frac{0,3V}{\sqrt{2}} = 0,21V$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,21V}{31,5V} \cdot 100 = 0,7\%$$

d)

$$U_{PIV} > 2 \cdot U_{2_t} = 2 \cdot 32,5V = 65V$$

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5.

ATH. Það verður ekkert spennufall yfir díóður þar sem engin straumur rennur í rásinni.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{10}{1} \cdot 230V = 2300V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \cdot 2300V = 3253V$$

$$U_{RL_{(t)}} = U_{2t} - 0V = 3253V - 0V = 3253V$$

$$U_{RL_{DC}} = \frac{U_{RL_{(t)}}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{3253V}{1 + \frac{1}{2 \cdot 50[hz] \cdot 220 \cdot 10^{-6}[uF] \cdot \infty[\Omega]}} = 3253V$$

b)

$$U_{RLgára_{(t)}} = U_{RL_t} - U_{RL_{DC}} = 3253V - 3253V = 0V$$

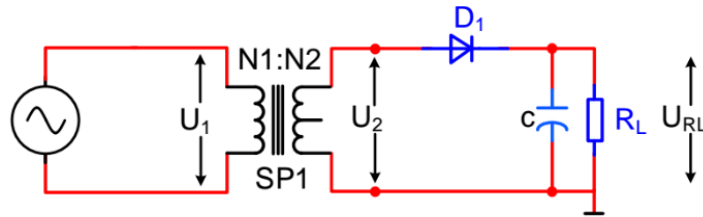$$U_{RLgára} = \frac{U_{RLgára_{(t)}}}{\pi} = \frac{0V}{\pi} = 0V$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0V}{3253V} \cdot 100 = 0\%$$

d)

$$U_{PIV} > 2 \cdot U_{2_t} = 2 \cdot 3253V = 6506V$$

6.

a)

$$U_2 = \frac{N_2}{N_1} \cdot U_1 = \frac{1}{15} \cdot 230V = 15,3V$$

$$U_{2t} = \sqrt{2} \cdot U_2 = \sqrt{2} \bullet 15,3V = 21,7V$$

$$U_{RL_{(t)}} = U_{2t} - 0,7V = 21,7V - 0,7V = 21V$$

$$U_{RL_{DC}} = \frac{U_{RL_{(t)}}}{1 + \frac{1}{2 \cdot f \cdot C \cdot R_L}} = \frac{21V}{1 + \frac{1}{2 \cdot 50[hz] \cdot 2200 \cdot 10^{-6}[uF] \cdot 220[\Omega]}} = 20,6V$$

b)

$$U_{RLgára_{(t)}} = U_{RL_t} - U_{RL_{DC}} = 21V - 20,6V = 0,4V$$

$$U_{RLgára} = \frac{U_{RLgára_{(t)}}}{\sqrt{2}} = \frac{0,4V}{\sqrt{2}} = 0,28V$$

c)

$$r[\%] = \frac{U_{RLgára}}{U_{RL_{DC}}} \cdot 100 = \frac{0,28V}{20,6V} \cdot 100 = 1,4\%$$

d)

$$U_{PIV} > 2 \cdot U_{2_t} = 2 \cdot 21,7V = 43,4V$$

Höfundur er Sigurður Örn Kristjánsson.
Eftirvinnsla og umbrot í rafbók Bára Halldórsdóttir.

Vinsamlegast sendið leiðréttingar og athugasemdir til höfundar eða til Báru
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