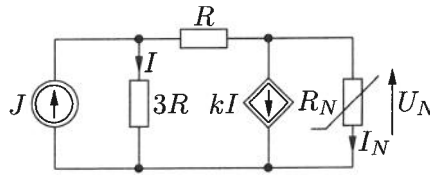
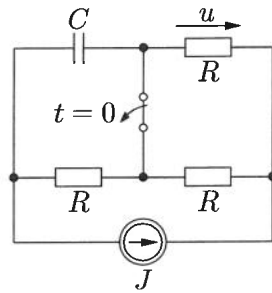


WEL 21Z gr. 1E3 Kolokwium 2

**Zadanie 1. (9 pkt)** Dany jest nieliniowy obwód prądu stałego. Wyznaczyć punkt pracy oporu nieliniowego. Wykorzystać twierdzenie o źródłach zastępczych. Dane:  $J = 8 \text{ A}$ ,  $R = 3 \Omega$ ,  $k = 2 \text{ A/A}$ ,  $R_N : U_N = a|I_N|$ ,  $a = 4 \frac{\text{V}}{\text{A}^2}$ .

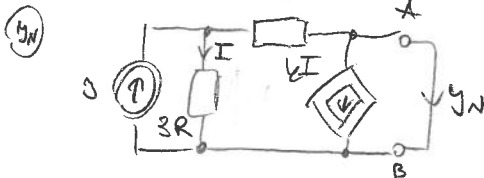


**Zadanie 2. (10 pkt)** W obwodzie przedstawionym na rysunku przed chwilą  $t = 0$  panował stan ustalony. W chwili  $t = 0$  klucz został otwarty. Wyznaczyć i narysować przebieg napięcia  $u$ . Dane:  $J = 2 \text{ mA}$ ,  $R = 3 \text{ k}\Omega$ ,  $C = 1 \text{ nF}$ .



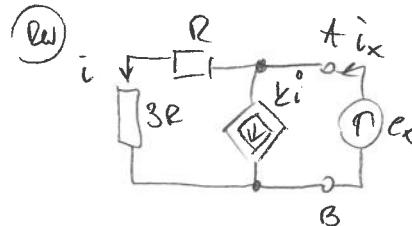
Zadanie 1:

$\{V, A, \Omega\}$



$$y_N = y - I - kI = y - (k+1)I = 8 - 3 \cdot 2 = 2 \text{ A}$$

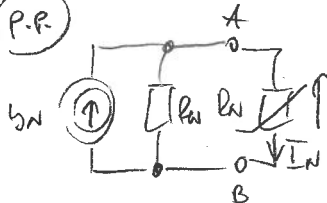
$$I = y \frac{R}{R+3R} = \frac{1}{4} y = 2 \text{ A}$$



$$i = \frac{e_x}{4R} \quad i_x = (k+1)i$$

$$R_N = R_{AB} = \frac{e_x}{i_x} = \frac{4R}{k+1} = \frac{4 \cdot 3}{3} = 4 \Omega$$

(P.R.)



$$u_N = (y_N - I_N) R_N = 0 \Rightarrow I_N |I_N| = 0 \Rightarrow 4|I_N| + 4I_N - 8 = 0$$

$$I_N |I_N| + I_N - 2 = 0 \Rightarrow I_N = 1 \text{ A}; u_N = 4 \text{ V}$$

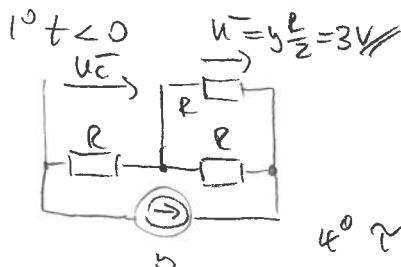
Zadanie 2:  $\{V, \text{mA}, \mu\text{s}, \mu\text{s}\}$

$2^\circ t = 0^+$  z superpozycji

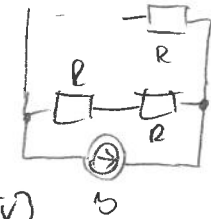
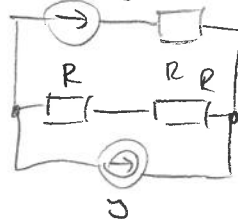
$$u_C^0 = u_C^- \Rightarrow u^0 = y R \parallel (2R - \frac{1}{3} u_C^0)$$

$$= 2 \frac{2}{3} \cdot 3 - \frac{1}{3} \cdot 6 = 2 \text{ V}$$

$3^\circ t \rightarrow \infty$   $u^\infty = 0$

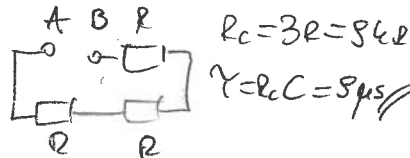


$$u_C^- = y R = 3 \text{ V}$$



$$u_C^- = y R = 6 \text{ V}$$

$4^\circ \tau$



$$R_C = 3R = 9 \text{ k}\Omega$$

$$\tau = R_C C = 9 \mu\text{s}$$

