Circuite Logice cu Diode. Poarta ȘI

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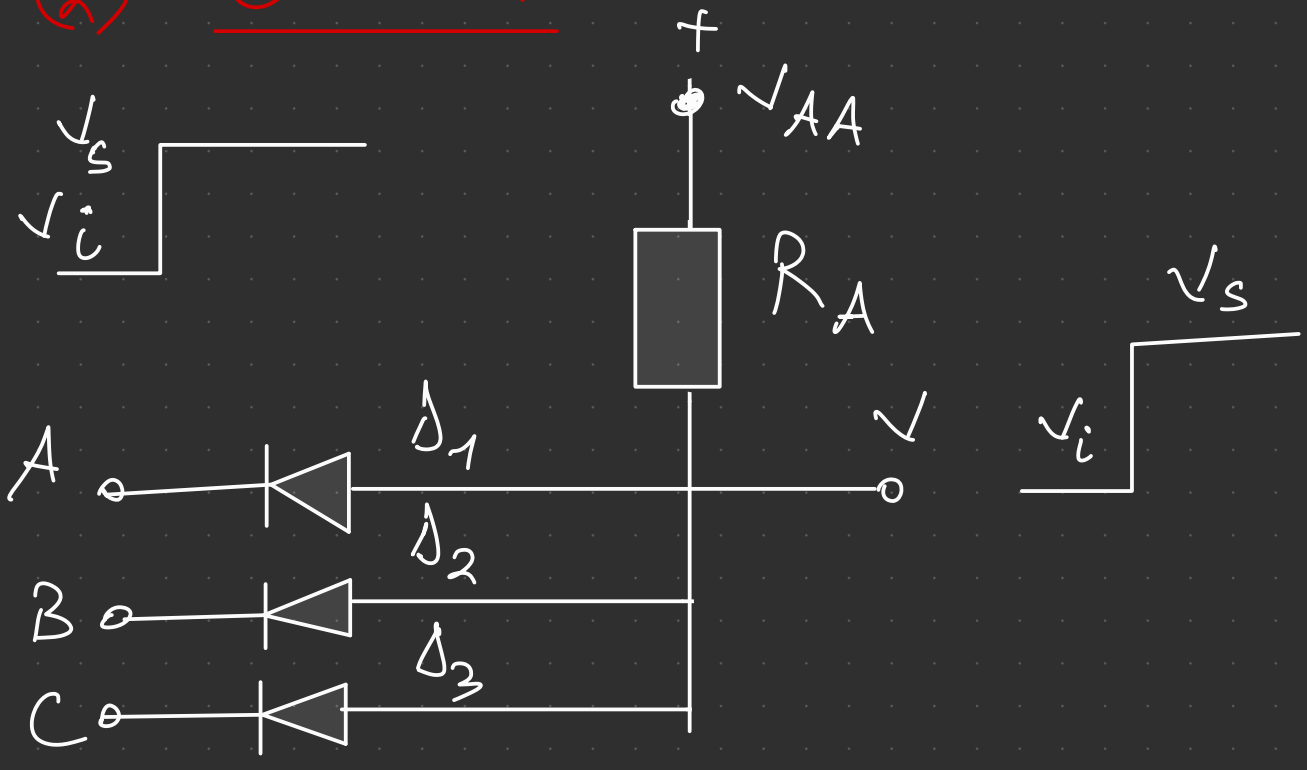
① Scopul lucrării

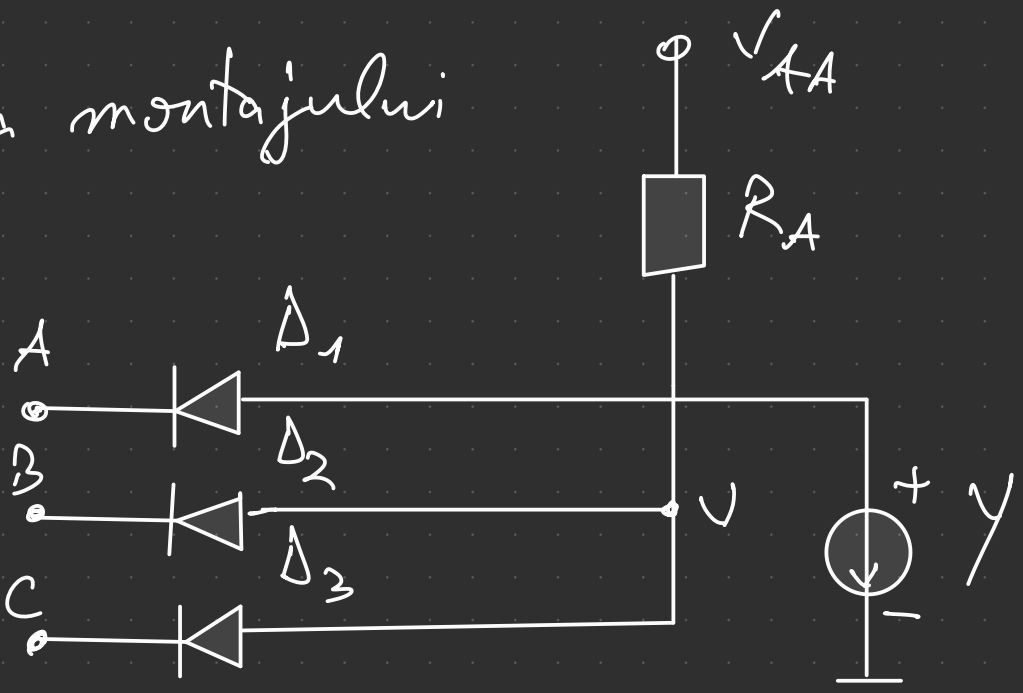
Se vor studia circuitele logice cu diode semiconductoare în regim static și dinamic.

② Circuitul



(3) Mersul lucrării

Schema montajului



(3.1)

$V_{AA} = 15V$
$R_A = 10k\Omega$
$V_I = 0V$
$V_S = 5V$

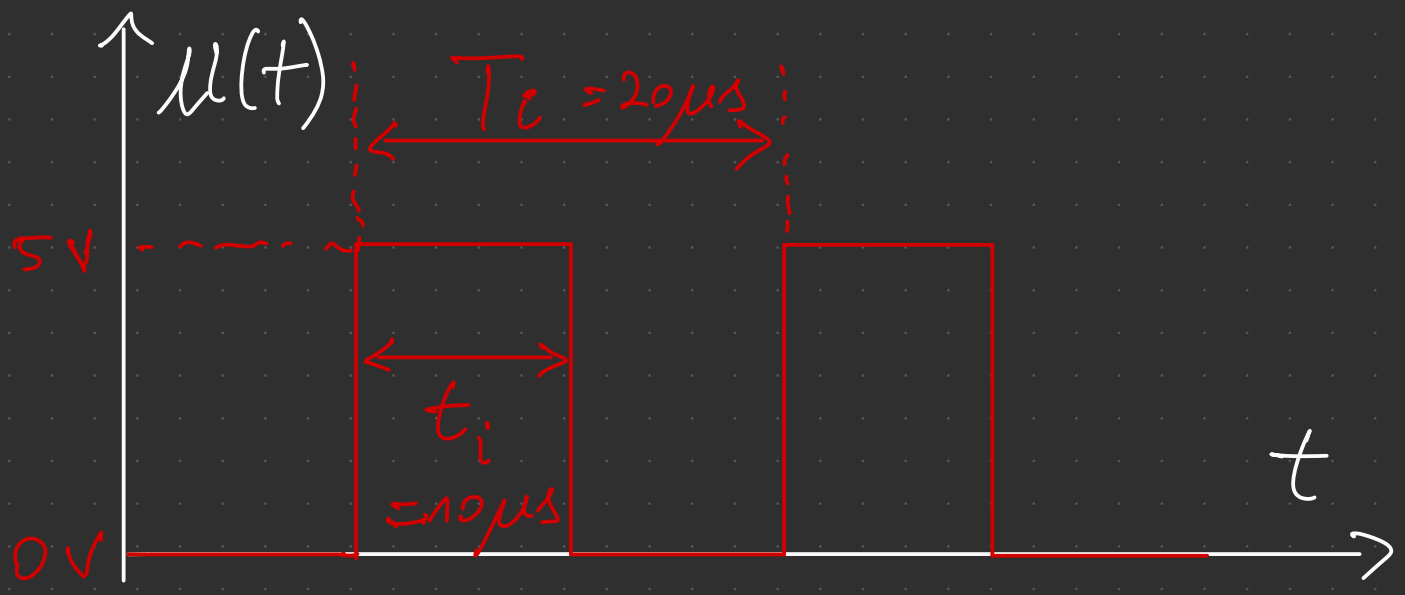
a) $V_A = V_B = V_C = V_I$
b) $V_A = V_B = V_C = V_S$
c) $V_A = V_I$, $V_B = V_C = V_S$
d) $V_A = V_B = V_I$, $V_C = V_S$

(3.2) -> măsurare curent de intrare pe A

(3.3) -> verificare funcția SI

(3.4) -> pt. cazul $V_A = V_B = V_C = 5V$
-> se aplică la intrare un impuls cu parametrii definiți astfel

$t_i = 10\mu s$ | $V_I = 0V$; $V_S = 5V$ | $T = 20\mu s$



Obs. -> vizualizare semnal de la ieșirea porții ; osciloscafiere

-> măsurare T_1 și T_c pt. parametrii dați

-> măs. T_1, T_c pt.
- 100pF
- 220pF
- 470pF
- 1nF
- 1,5nF

-> se modifică V_{AA} -> 5V, 10V, 20V (capacitate de 100pF) -> comp. cu 15V

$T_1 = R C \ln 2$ $\quad R_A = 13k\Omega$

$T_C = ?$ $\quad$ a) $C = 100pF$

$T = 25\mu s$ (5div · 5µs)

$t_i = 10\mu s$ (2div · 5µs)

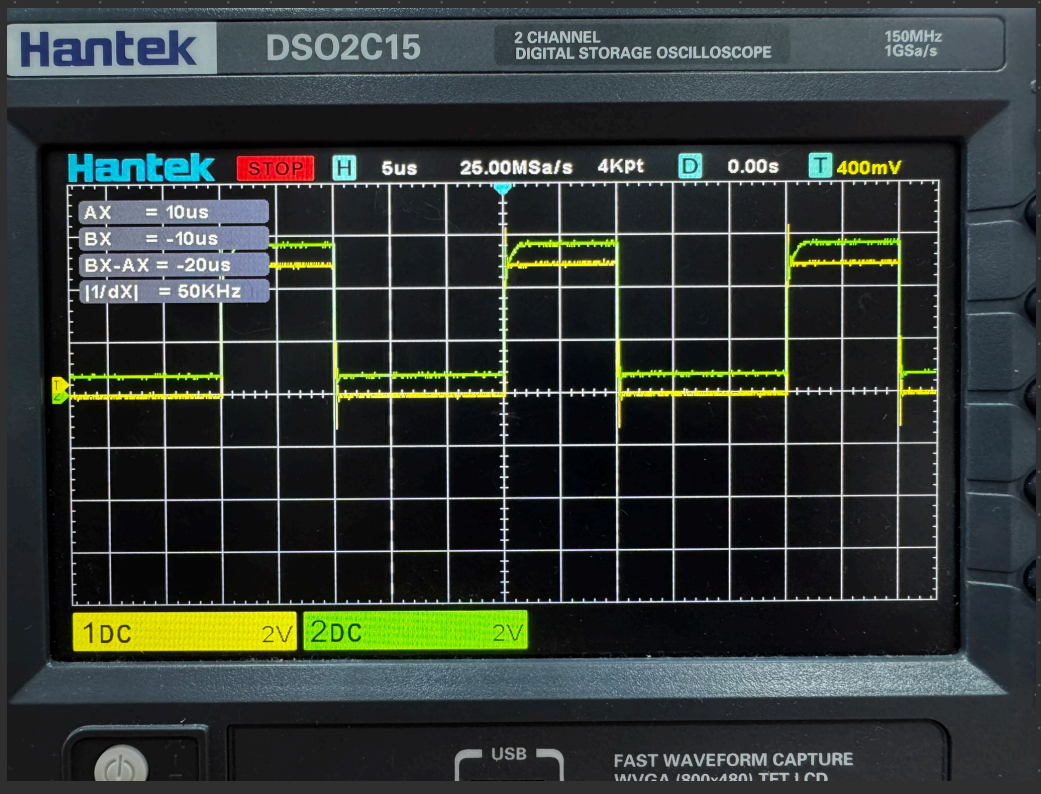
$T_1 = 13 \cdot 10^3 \cdot 100 \cdot 10^{-12} \ln 2$

$= 1300 \cdot 10^{-9} \ln 2$

$\sim 9,01 \cdot 10^{-7} s$ (calcul) $\sim 900\ ns$

$T_1 = 900\ ns$ (cursor)

$t_C \sim 200\ ns$



b) $C = 220\ pF$

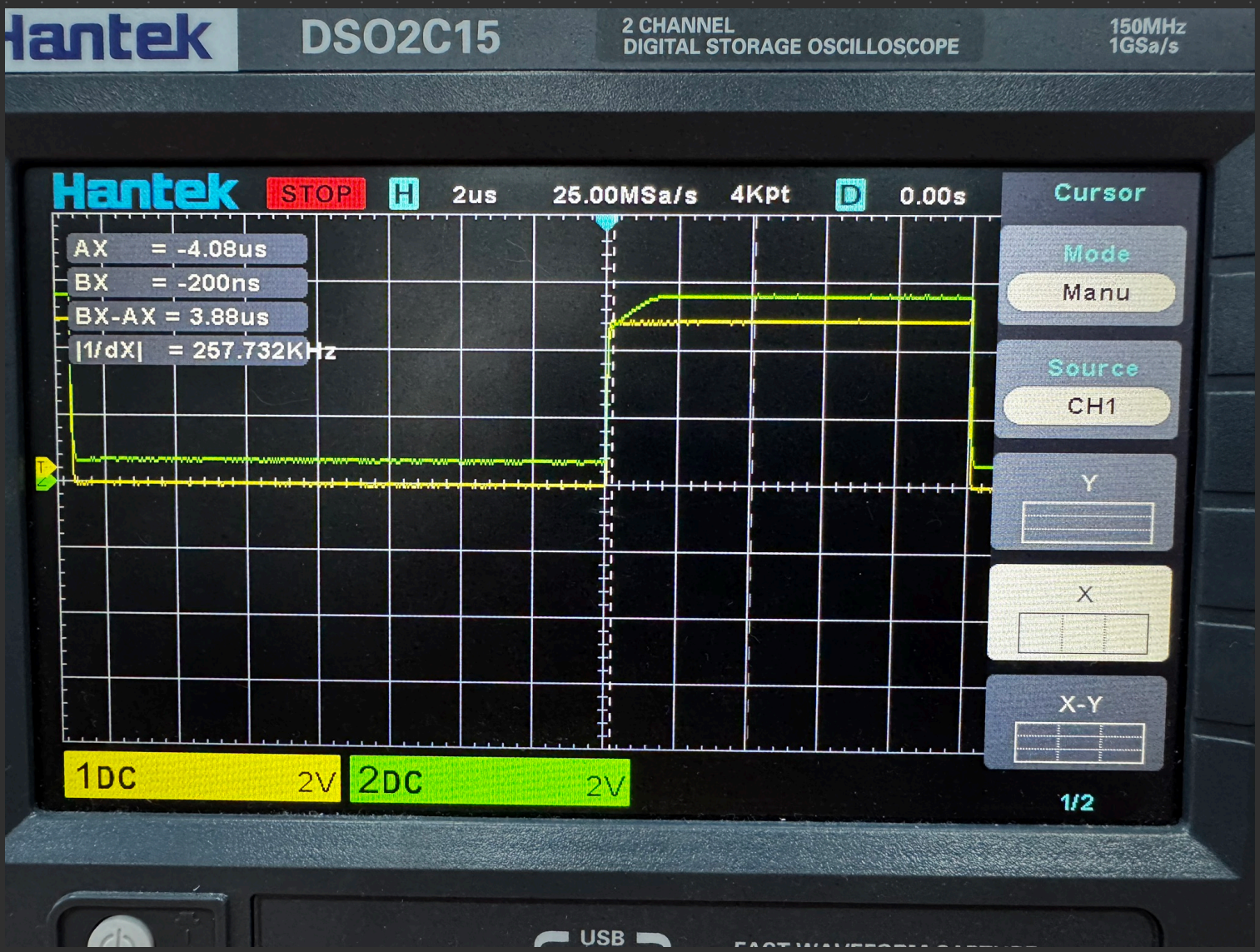
$T_2 = RC \ln 2$

$= 13 \cdot 10^3 \cdot 220 \cdot 10^{-12} \ln 2$

$= 1982\ ns = 1{,}98\ \mu s$ (calcul)

$T_2 = 1{,}12\ \mu s$ (curseur)

$t_c = 160\ ns$



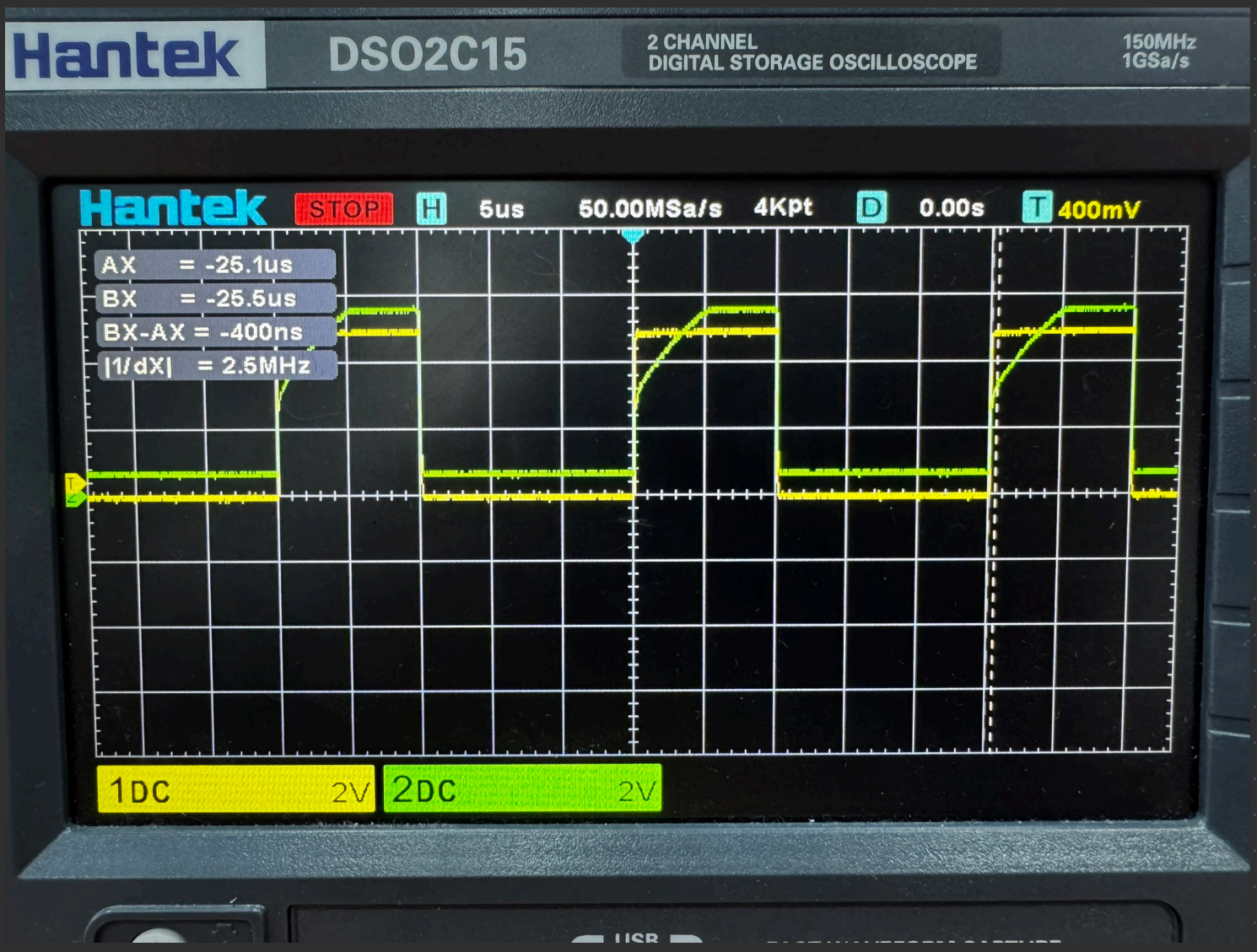
c) $C = 470\ pF$

$T_R = 4{,}3\ \mu s$ (curseur)

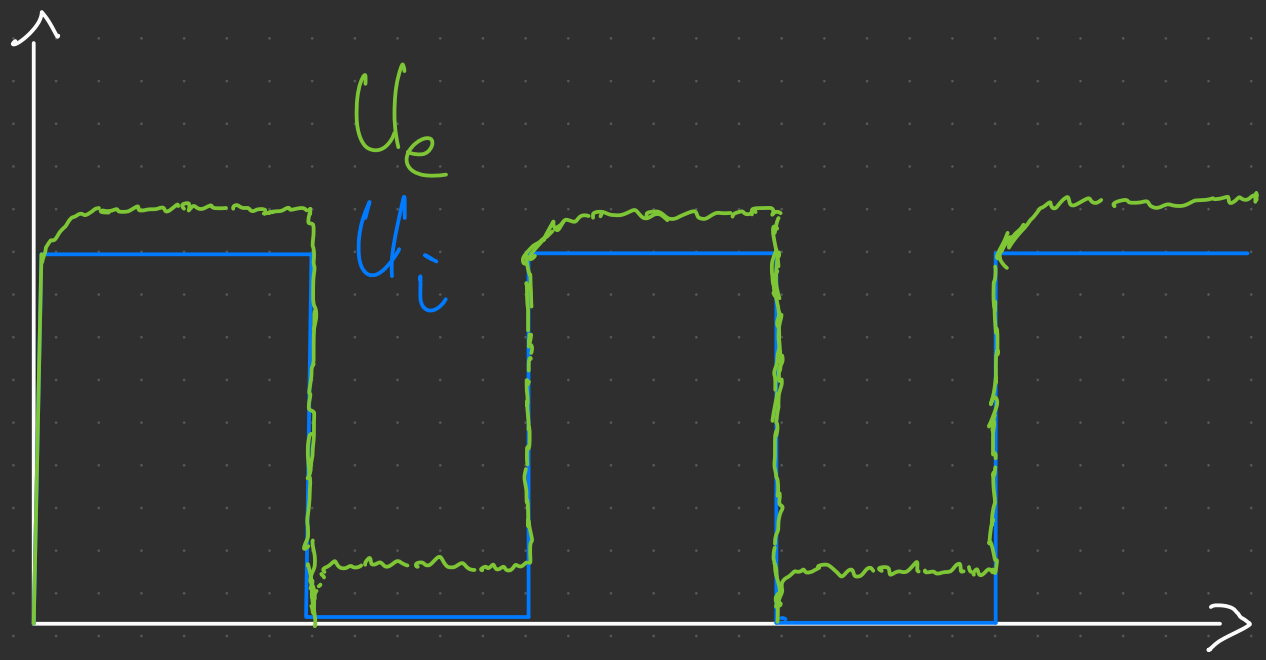
$T_R = RC \ln 2 = 13 \cdot 10^{3} \cdot 470 \cdot 10^{-12} \ln 2$

$= 4235 \cdot 10^{-9} = 4{,}235\ \mu s$

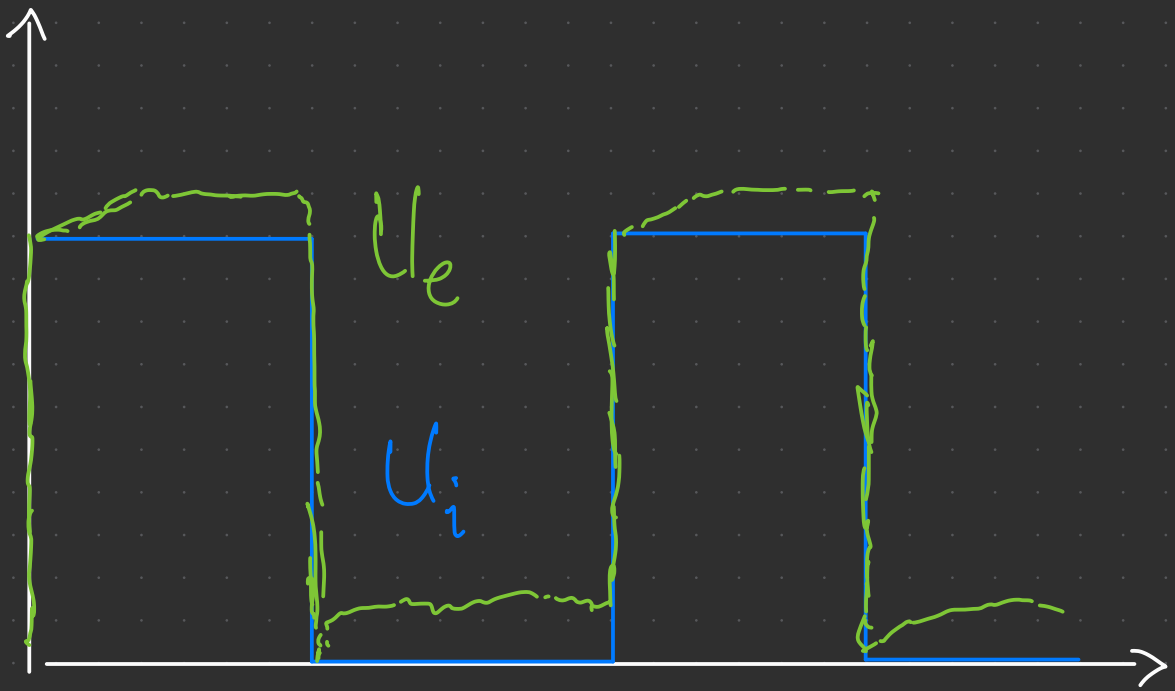
$t_c = 200\ ns$



a) $C = 100\,pF$



b) $C = 220\,pF$



c) $C = 470\,pF$