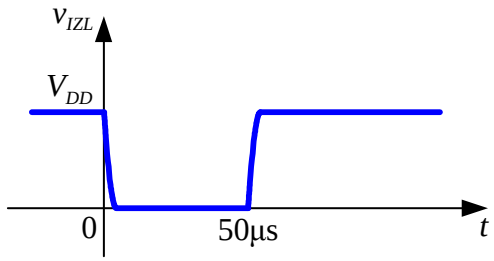
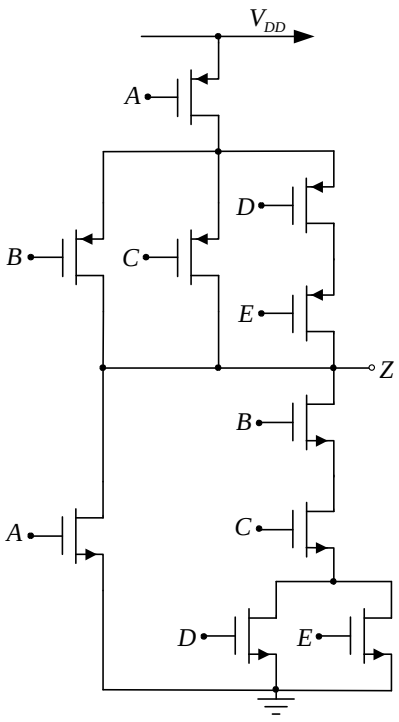
REŠENJA ZADATAKA

3.

$$v_{IZL}(t)=\begin{cases}5\text{V}, & t<0\\ 5\text{V}\cdot e^{-8{,}333\cdot 10^{8}\cdot t}, & 0\le t<50\mu\text{s}\\ 5\text{V}\cdot\left(1-e^{-8{,}333\cdot 10^{8}\cdot(t-50\mu\text{s})}\right), & t>50\mu\text{s}\end{cases}$$



4. a) $Z=\overline{A}\cdot\overline{B\cdot C\cdot(D+E)}=\overline{A+B\cdot C\cdot(D+E)}$



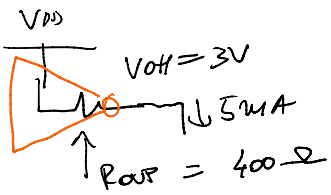
b) $\tau_{pu}=3\cdot r_{dsPMOS}\cdot C=750\text{ps}$

$\tau_{pr}=3\cdot r_{dsNMOS}\cdot C=300\text{ps}$

Tuesday, May 18, 2021 7:25 PM

SI ODE I KOLOKVIJUM 2021

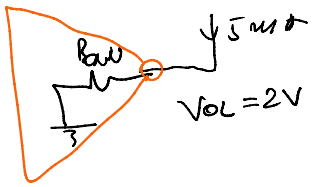
① a)



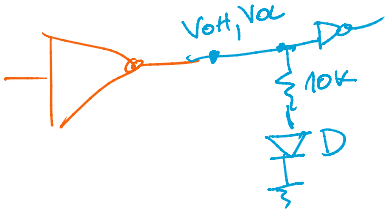
$V_{DD} - 400\Omega \cdot 5mA =$

$5V - 2000mV = 3V$

IZLAZNA OTPORNOST I ZA "1" I ZA "0" JE 400Ω



$R_{OUT} = 400\Omega$



KADA JE NA IZLAZU "1" TJ. V_{OH} POSTOJI STRUJA KROZ D

KADA JE NA IZLAZU "0" TJ V_{OL} STRUJA INVERTORA = 0

$V_{OH} = V_{DD} - R_{OU} \cdot I_{OH} = V_{DD} - R_{OU} \cdot \frac{V_{DD} - V_D}{R_{OU} + 10K}$

$= 5V - \frac{0.4}{10.4} \cdot 4.3V \approx 5V - 0.17V = 4.83V$

$NM(1) = V_{OH} - V_{IH} \approx 4.8V - 3V = 1.8V$

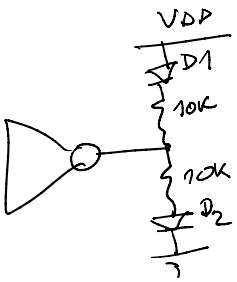
KADA JE NA IZLAZU V_{OL}, POŠTO JE STRUJA = 0,

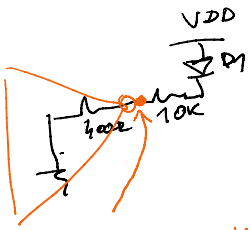
$V_{OL} = 0V \Rightarrow NM(0) = 2V - 0V = 2V$

b) POŠTO SU V_{IH} I V_{IL} PODJEDNAKO UDALJENI OD V_{DD} I MASE POTREBNO JE DA

$|I_{OH}(V_{OH})| = |I_{OL}(V_{OL})|$

NAJLAKŠE POSTIĆI AKO ISTO OPTEREĆIMO I V_{OH} I V_{OL}

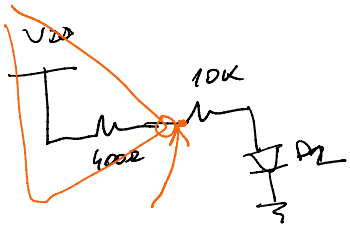




$V_{OL} = \frac{V_{DD} - V_D}{10.4K} \cdot 0.4K\Omega$

KADA JE NA IZLAZU V_{OL} D_2 JE ZAKOČENA

KADA JE NA IZLAZU V_{OH} D_1 JE ZAKOČENA



$V_{OH} = V_{DD} - \frac{V_{DD} - V_D}{10.4K} \cdot 0.4K$

$NM(1) = V_{OH} - V_{IH} = V_{DD} - \frac{4.3V}{\ldots} - 3V$

$V_{OL} = \frac{V_{DD} - V_D}{10.4K} \cdot 0.4K$

$NM_{(0)} = V_{IL} - V_{OL} = 2V - \frac{4.3V}{26}$

JE NA IZLAZU V_{OH} D_1 JE ZAKOČENA

$V_{OH} = V_{DD} - \frac{V_{DD} - V_D}{10.4K} \cdot 0.4K$

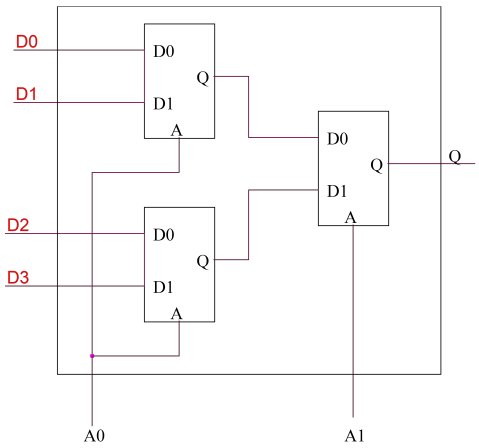
$NM_{(1)} = V_{OH} - V_{IH} = V_{DD} - \frac{4.3V}{26} - 3V$ ($\uparrow 5V$)

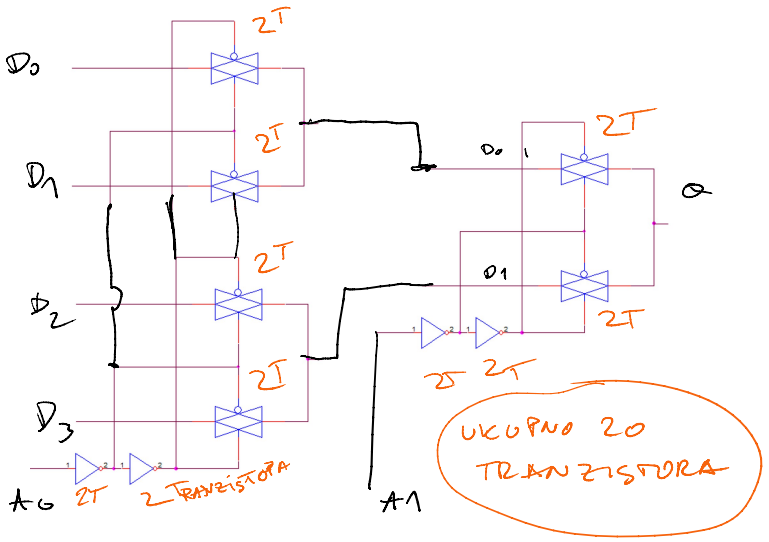
ISTO!

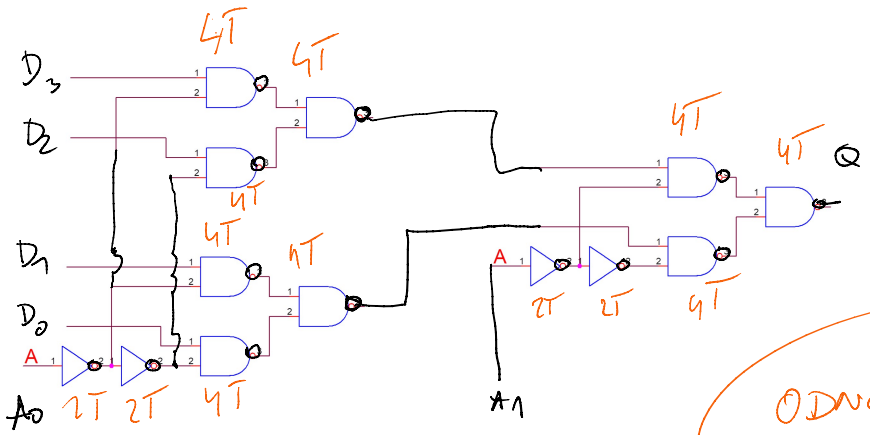
$= 2V - \frac{4.3V}{26}$

(2) ZADATAK

Par selekcionih invertora je zajednički za A0







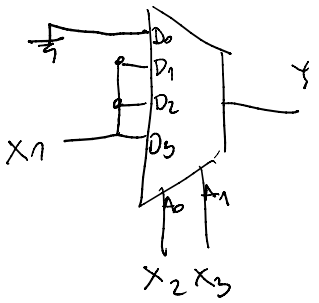
$$n_{tran} = 3 \times 12\big|_{NI} + 2 \times 4\big|_{invertori} = 44$$

c) $y = x_1 x_2 (x_3 + \bar{x}_3) + x_1 x_3 (x_2 + \bar{x}_2) =$

$= x_1 x_2 x_3 + x_1 x_2 \bar{x}_3 + x_1 x_2 x_3 + x_1 \bar{x}_2 x_3$

$$= x_1 x_2 x_3 + x_1 x_2 \overline{x_3} + x_1 \overline{x_2} x_3$$

$$x_1 \cdot A_0 A_1 + x_1 A_0 \overline{A_1} + x_1 \overline{A_0} A_1 + 0 \cdot \overline{A_0} \overline{A_1}$$



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1 ZBIRKU
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