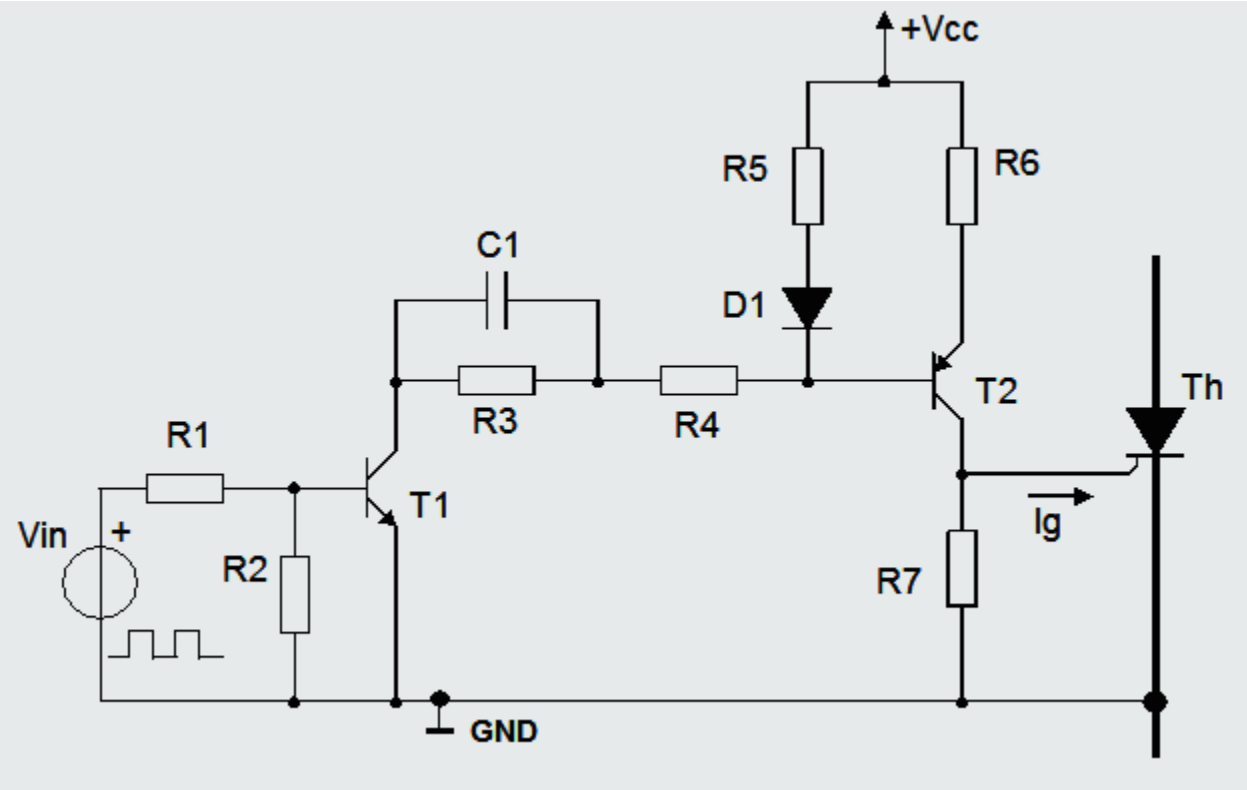
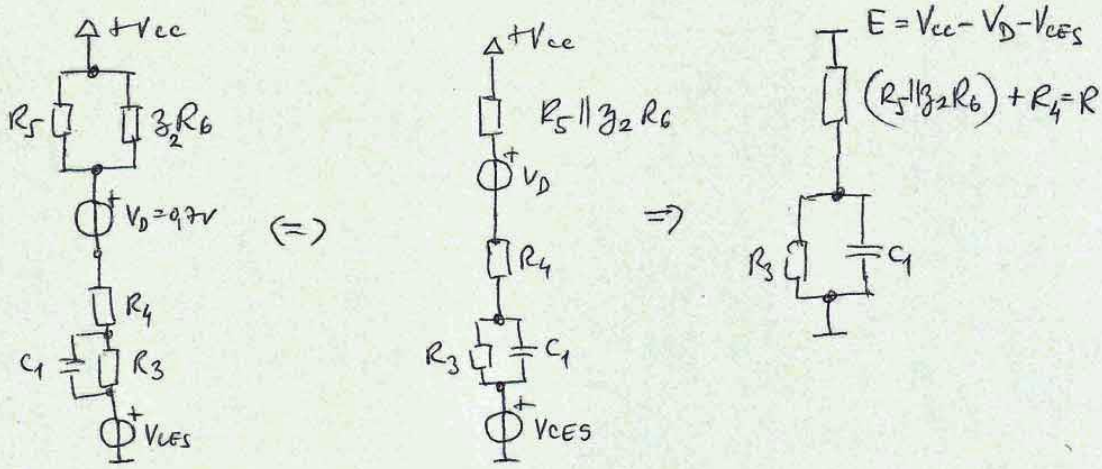
1. Za impulsni pojačavač, prikazan na slici potrebno je odrediti talasni oblik struje gejta tiristora Th. Pojačanje tranzistora T1 je β1= 200, pojačanje tranzistora T2 je β2= 400. Karakteristični naponi za tranzistore su $V_{BE}$= 0.7 V i $V_{CES}$ = 0.2V. Napon napajanja pojačavača je $V_{CC}$= 15V. Ulazni signal (Vin) je impulsni amplitude 10 V i učestanosti *f*. Maksimalni napon gejta je Ugmax=3V. Pri uslovima datim u zadatku izračunati maksimalnu učestanost "češlja" pobudnih strujnih impulsa tiristora Th. Vrednosti otpornosti u kolu su: R1=4k7, R2=1k, R3=1k8, R4=1k4, R5=100Ω, R6=2Ω i R7=100 Ω. Vrednost kondenzatora C1=100nF. Napon diode $V_{D1}$=0.7V



## 1 ZADATAK

a) Kada je tranzistor $T_1$ uključen (u zasićenju) ekvivalentna šema pobuđenog kola je:

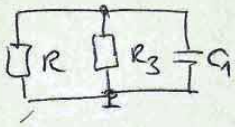



$$R = 1k4 + \{100 \parallel (400 \cdot 2)\} = 1400 + \left(\frac{100 \cdot 800}{900}\right) = 1489\,\Omega$$

$R_3 = 1k8$

$C_1 = 100\,nF$

* vremenska konstanta $\tau_1$




$$\tau_1 = (R \parallel R_3) \cdot C_1$$

$$\tau_1 = \frac{R \cdot R_3}{R + R_3} \cdot C_1 = \frac{1800 \cdot 1489}{1800 + 1489} \cdot 100\,nF = 81{,}48\,\mu s$$

* vremenska konstanta $\tau_2$ ($C_1$ se pražni kroz $R_3$ kada je $T_1$-OFF)

$$\tau_2 = R_3 \cdot C_1 = 1800 \cdot 100\,nF = 180\,\mu s$$

U trenutku uključenja $u_{C_1}(0) = 0$ struja tranzistora

$$I_{T_1} = \frac{E}{R} = \frac{V_{CC} - V_D - V_{CES}}{R} = \frac{15 - 0{,}7 - 0{,}2}{1489} = 9{,}47\,mA$$

Napon na $V_{R_5 \parallel 2R_6} = (R_5 \parallel 2R_6) \cdot I_{T_1} = 88{,}88 \cdot 9{,}47\,mA = 0{,}8417\,V$

struja kolektora $T_2$ $I_{C_2\,max} = \frac{0{,}8417\,V}{2\,\Omega} = 0{,}42\,A$

U stacionarnom stanju napon na $C_1$

$$u_{C1}(\infty) = \frac{R_3}{R_3+R} \cdot E = \frac{1800}{1800+1489} \cdot (15-0{,}7-0{,}2)$$

$$u_{C1}(\infty) = 7{,}716\,V$$

Struja kroz R u ovom slučaju je: $I_R = \frac{14{,}1-7{,}716}{1489}$

$$I_R = 4{,}287\,mA$$

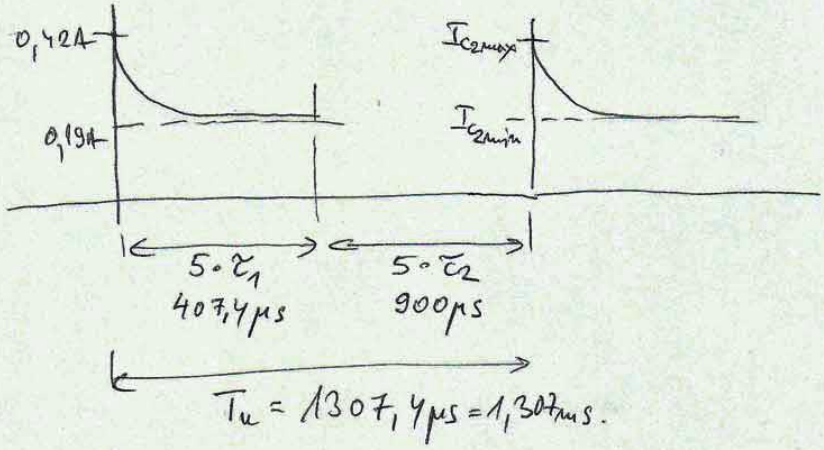
Napon

$$V_{R_5 \| z_2 R_6} = 88{,}88 \cdot 4{,}287\,mA = 0{,}381\,V$$

Struja kolektora $T_2$ (minimalna)

$$I_{C2min} = \frac{0{,}381}{2} = 0{,}190\,A$$

Tačkasti oblik struje čeja $I_g$ tiristora Th



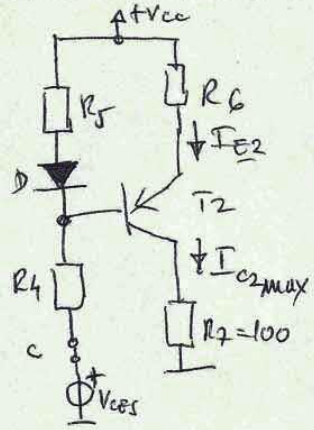

$$T_u = 1307{,}4\,\mu s = 1{,}307\,ms.$$

Maksimalna učestanost „čeja" pošto impuls je $f_{max} = \frac{1}{1{,}307\,ms}$

$f_{max} = 765\,Hz \rightarrow$ maksimalno rastojanje $f_{čeja} = 700\,Hz$

STRUJE $I_{C2max}$ i $I_{C2min}$ ze względu odległości i powrotu stanowiska generatora

TRZEBA NARYSOWAĆ PO WŁĄCZENIU T1 !

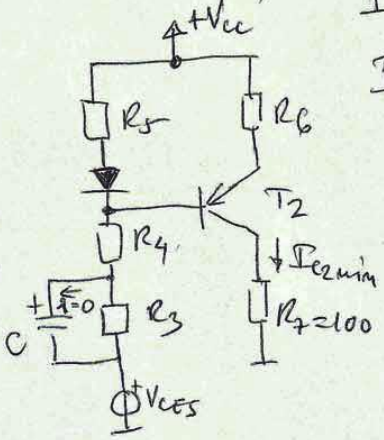



$$I_{E2max} = I_{C2max} = \frac{V_{CC} - V_D - V_{CES}}{R_4 + R_5} \cdot \frac{R_5}{R_6}$$

$$I_{E2max} = \frac{15 - 0{,}7 - 0{,}2}{1500} \cdot \frac{100}{2}$$

$$I_{E2max} = I_{C2max} = 0{,}47\,A$$

NAŁADOWANIE NAPIĘCIOWE C = 100μF ($i_C = 0$) EKWIW. DZIAŁA ZE




$$I_{E2min} = I_{C2min} = \frac{V_{CC} - V_D - V_{CES}}{R_3 + R_4 + R_5} \cdot \frac{R_5}{R_6}$$

$$I_{E2min} = I_{C2min} = \frac{15 - 0{,}7 - 0{,}2}{1800 + 1400 + 100} \cdot \frac{100}{2}$$

$$I_{C2min} = 0{,}213\,A$$