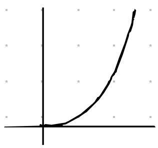
4.1. Sklopovi s diodama

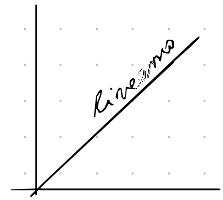
Usporedba diode i otpornika

Schockleyeva jednadžba

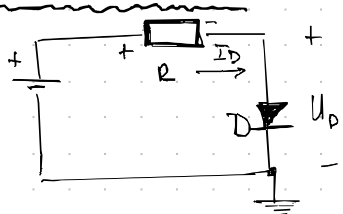


$$I_D = I_S \exp\left(\frac{U_D}{U_T}\right)$$

$$R = \frac{U}{I} \rightarrow$$



Statička analiza

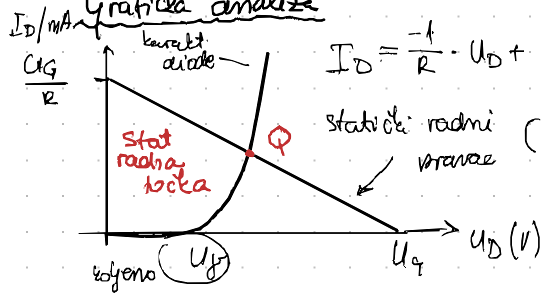


$$I_D = I_S \exp\left(\frac{U_D}{U_T}\right)$$

$$U_G = U_D + I_D \cdot R$$

$$U_G = U_D + I_S \exp\left(\frac{U_D}{U_T}\right) \cdot R$$

Grafička analiza



$$I_D = \frac{-1}{R} \cdot U_D + \frac{U_G}{R}$$

statički radni pravac (SRP)

→ znati crtati i tumačiti!

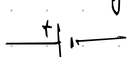
$Q\,(U_{DQ},\ I_{DQ})$

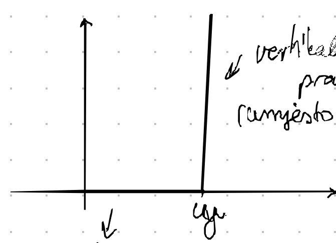
Analitički postupak

⇒ možemo nadomjestiti

$U_D < U_\gamma$

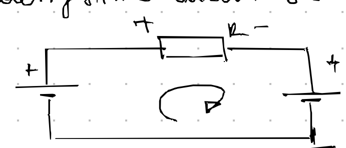
$U_D \geq U_\gamma$ →





verikalni pravac (umjesto eksponencijalne karakteristike)

II. nadomjestimo diodu sa izvorom:



$$\rightarrow U_{DQ} = U_\gamma$$

$$I_{DQ} = \frac{U_G - U_\gamma}{R}$$

Primjer 4.2:

$U_{DQ} = 0{,}7\,V$

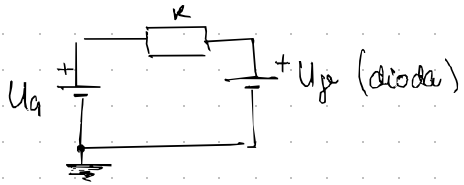
$I_{DQ} = \frac{3 - 0{,}7}{500} = 4{,}6\,mA$

~ 180. str

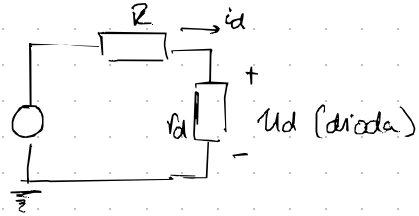
METODA SUPERPOZICIJE

① Statika → (1,5) dinamički parametri → ② Dinamika

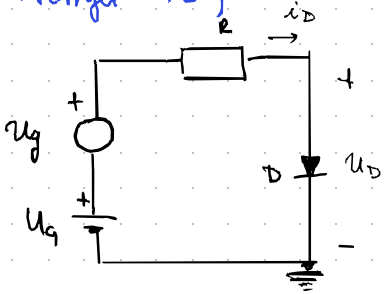
~ DC signal
~ DC izvor → gasimo AC
~ model diode za DC signal



~ AC signali
~ AC izvor → gasimo DC
~ AC model diode



Primjer 4.3)



$U_G = 3 + 0{,}5 \sin \omega t$ V

$R = 500\,\Omega$

$U_\gamma = 0{,}7$ V $T = 300$ K $U_T = 25$ mV

(1,5 međukorak) dinamički parametri

$$r_d\big|_Q = \frac{U_I}{I_{DQ}} = \frac{25\,mV}{4{,}6\,mA} = 5{,}43\,\Omega$$

① Statika

$U_{DQ} = U_\gamma = 0{,}7$ V

$$I_{DQ} = \frac{U_G - U_{DQ}}{R} = 4{,}6\,mA$$

② Dinamika

$$I_{dm} = \frac{U_{Gm}}{R + r_d} = \frac{900}{500 + 5{,}43} = 0{,}989\,mA$$

$U_{dm} = I_{dm} \cdot r_d = 0{,}989\,mA \cdot 5{,}43\,\Omega$

$U_{dm} = 5{,}37$ mV

} amplitude sinusne struje i napona

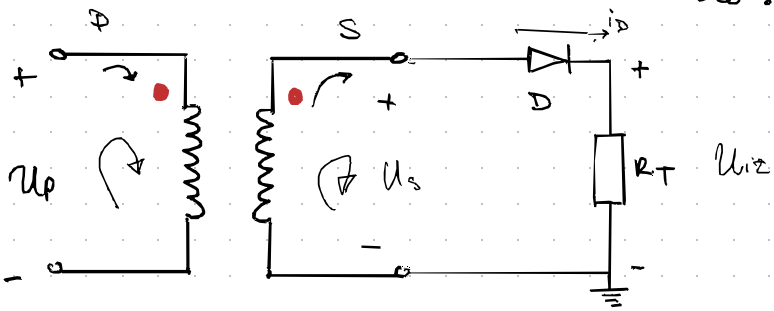
$U_{uk.\,pojačanje} = DC_{pojačanje} + AC_{pojačanje}$

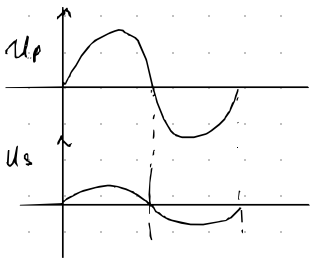
$$\Rightarrow \begin{cases} v_D(t) = 700 + 5{,}37 \sin \omega t \ \ mV \\ i_D = 4{,}6 + 0{,}989 \sin \omega t \ \ mA \end{cases}$$

Poluvalni ispravljač

*teorijska pitanja na ispitu

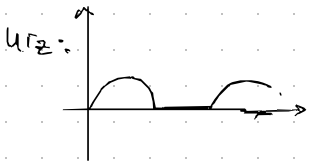
– točkice kažu kako su polarizirani



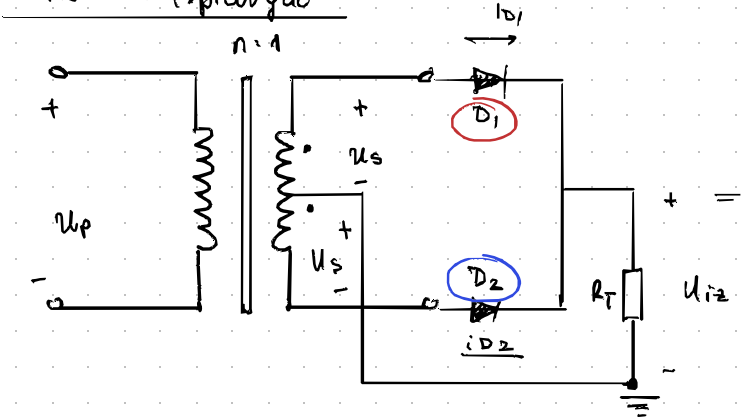


↳ako je na sekundaru pozitivna poluperioda => propusna polariz.

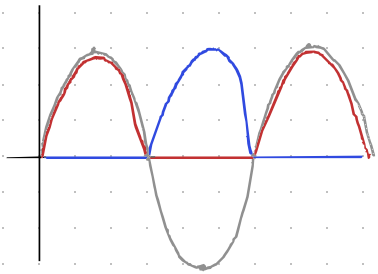
↳ neg. polup. => zaporna



Punovalni ispravljač



faktor valovitosti u punom valnom je manji



iz područja ispravljača dodaj samo teorija!!