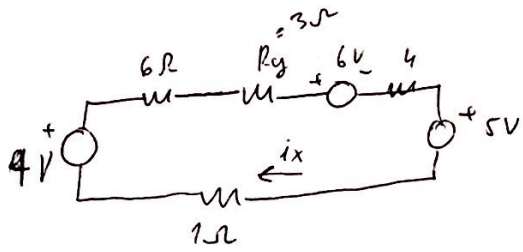


① a) $V = 4V$ d) $V = 5V$
 $R_T = 6\Omega$ $R_T = 4\Omega$

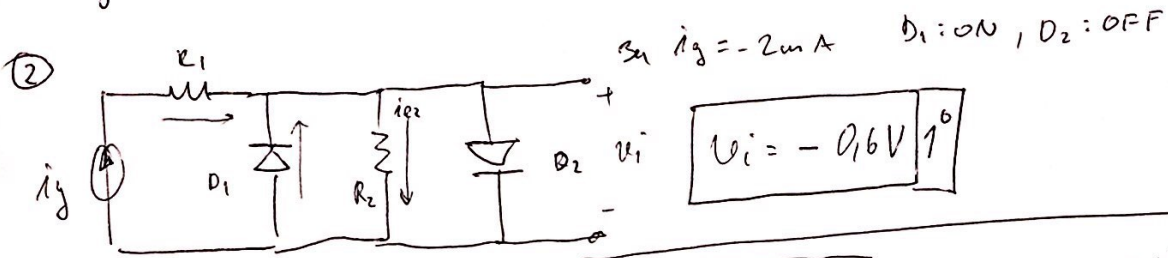


$$i_x(1+3+6) + 11V - 4V = 0$$

$$i_x \cdot 10 = -4$$

$$i_x = -\frac{1}{2} A$$

$P_{Rg} = \frac{3}{4} W$ $P_{6V} = 3W$



$$V_i = -0,16V \quad 1^\circ$$

$$i_{R2} = -\frac{V_D}{R_2} = -0,16mA$$

$$i_g + i_D = i_{R2} \quad i_D = i_{R2} - i_g$$

$$i_{D1} = -0,16mA - i_g > 0$$

3u $i_g = -0,16mA$ $D_1 \rightarrow OFF$

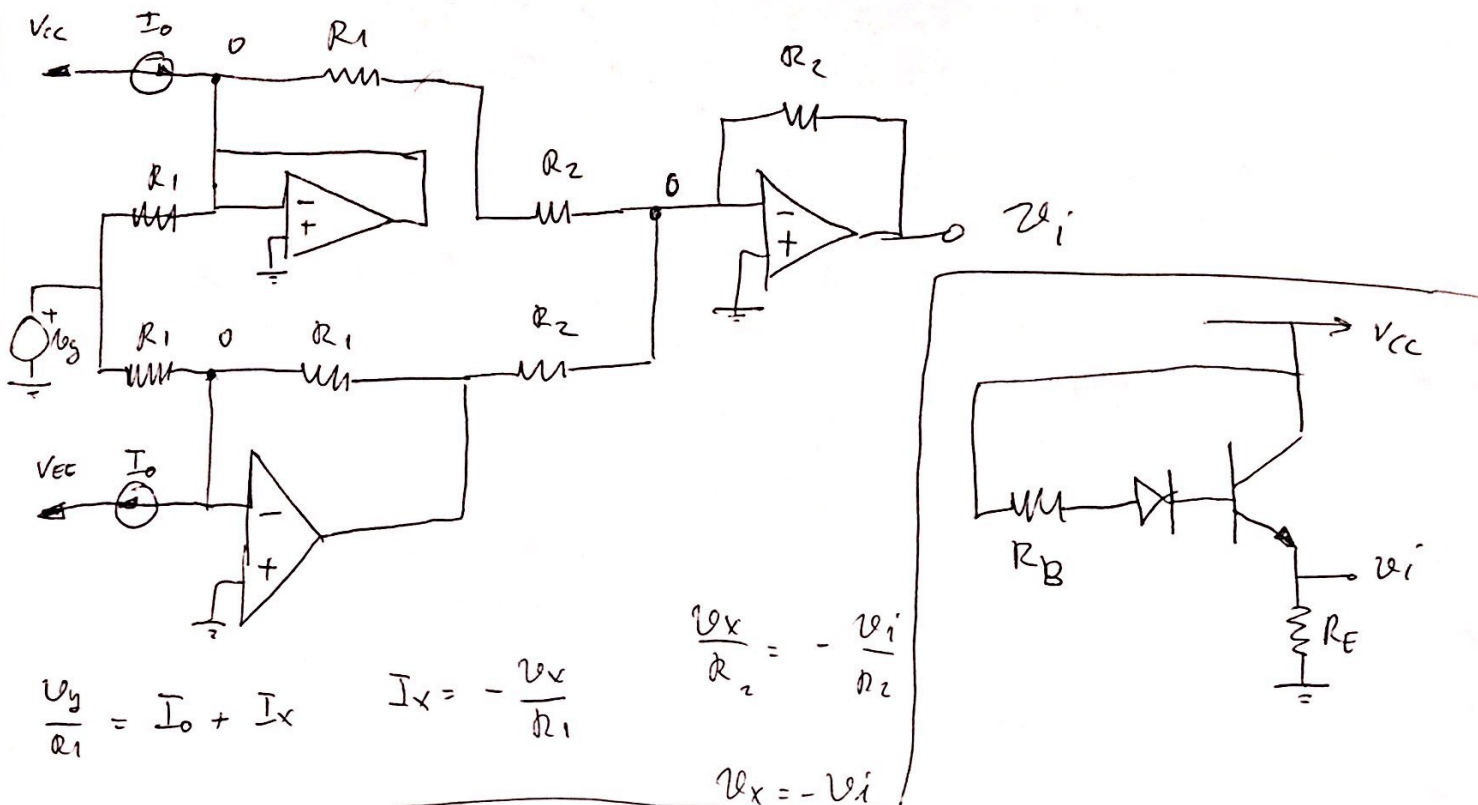
$$V_i = i_g R_2 \quad 2^\circ \quad 3u \quad i_g \in (-0,16, 0,16)$$

3u $V_i = V_D$ $i_g = 0,16mA$ $D_2 \rightarrow ON$

$$V_i = V_D = 0,16V \quad 3^\circ$$

$i_{R2} = 0,16mA$ $i_{D2} = i_g - i_{R2} = i_g - 0,16mA > 0$

D_2 : oswaje ON



$$\frac{V_y}{R_1} = I_0 + I_x$$

$$I_x = -\frac{V_x}{R_1}$$

$$\frac{V_x}{R_2} = -\frac{V_i}{R_2}$$

$$V_x = -V_i$$

$$\frac{V_y}{R_1} = I_0 + \frac{V_i}{R_1}$$

$$V_i = V_y - I_0 R_1$$

$$\text{a)} \quad V_{CC} - i_B R_B - V_D - V_{BE} - (1 + \beta) R_E \cdot i_B = 0$$

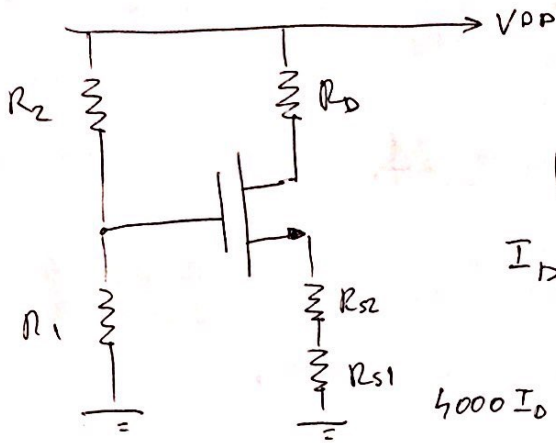
$$i_B = \frac{V_{CC} - V_D - V_{BE}}{R_B + (1 + \beta) R_E} = 0,189 \text{ mA}$$

$$V_{CE} = 1,91 \text{ V}$$

$$V_{CE} = 3,09 \text{ V}$$

$$V_{CC \text{ min}} = 1,2 \text{ V}$$

5) DC:



$$V_G = V_{DD} \cdot \frac{R_1}{R_1 + R_2} = 4.18 \text{ V}$$

$$I_D = \frac{\beta}{2} (4.18 - I_D \cdot 6000 - 1 \text{ V})^2$$

$$4000 I_D = (3.18 - 6000 I_D)^2$$

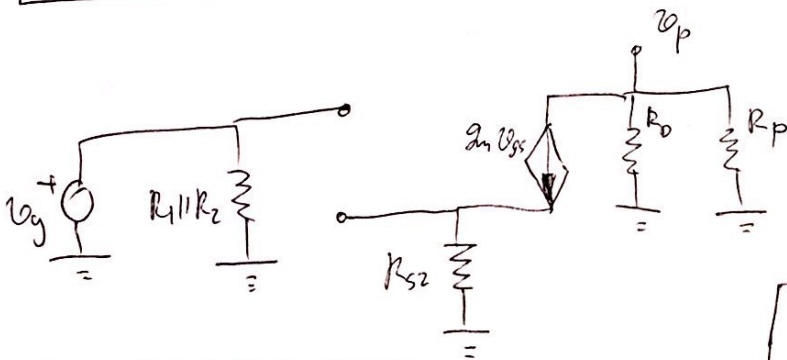
$$6000^2 I_D^2 - 49600 I_D + 14.44 = 0$$

$$I_{D1} = \frac{49600 \pm 19514}{2 \cdot 6000^2}$$

~~$I_{D1} = 960 \mu\text{A} \quad V_{S1} = 5.76 \text{ V}$~~
 $I_{D2} = 418 \mu\text{A} \quad V_{S2} = 2.508 \text{ V}$

$$V_D = V_{DD} - R_D I_D = 6.984 \text{ V}$$

$$g_m = 646 \mu\text{S}$$



$$V_S = g_m V_{GS} R_{S2}$$

$$V_S = g_m R_{S2} V_G - g_m V_S R_{S2}$$

$$V_S (1 + g_m R_{S2}) = g_m R_{S2} V_G$$

$$V_S = \frac{g_m R_{S2}}{1 + g_m R_{S2}} V_G$$

$$V_{GS} = \frac{1}{1 + g_m R_{S2}} \cdot V_G$$

$$V_p = -g_m V_{GS} \cdot R_p \parallel R_D = - \frac{g_m R_p \parallel R_D}{1 + g_m R_{S2}} V_G$$

$a_v = -4.2$

$$R_{iL} = R_1 \parallel R_2 = 600 \text{ k}\Omega$$

$$R_{i2L} = R_D = 12 \text{ k}\Omega$$