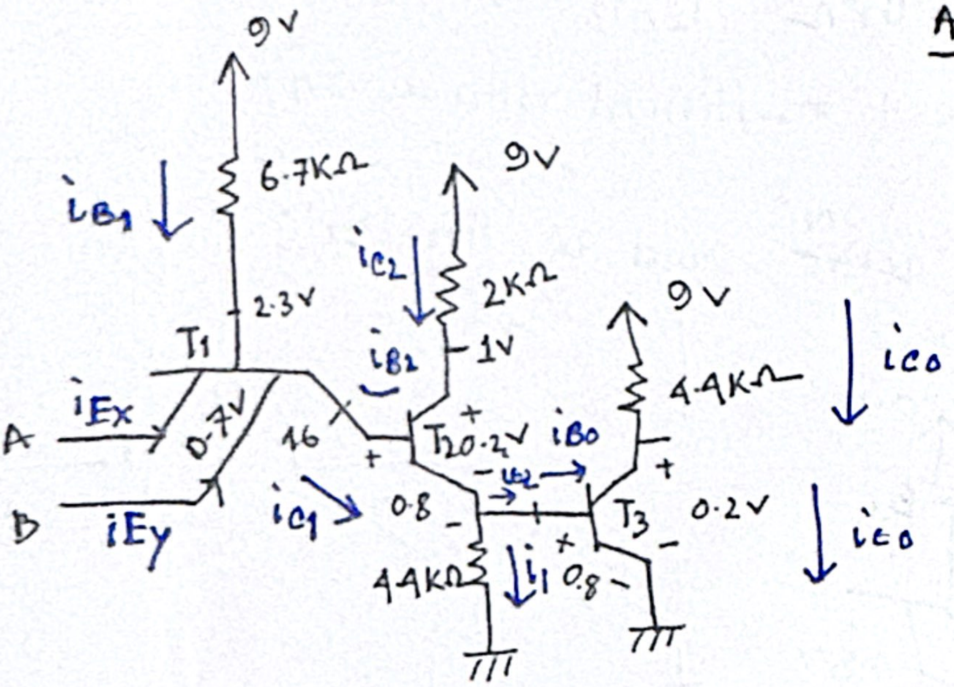


Assumptions:

T_2 and T_3 to be saturation

T_1 in reverse active

Finding necessary currents

$$i_{B1} = \frac{9-2.3}{67} = 1mA$$

$$i_{Ey} = i_{Ex} = \beta r \times i_{B1} = 0.1 \times 1\ mA = 0.1\ mA$$

$$i_{C1} = i_{B2} = i_{Ex} + i_{Ey} + I_{B1} = 0.1 + 0.1 + 1 = 1.2 mA$$

$$i_{C2} = \frac{9-1}{2} = 4mA$$

$$i_{E2} = i_{B2} + i_{C_2} = 4 + 1.2 = 5.2mA$$

$$i_1 = \frac{0.8}{4} = 0.18\ mA$$

$$i_{B0} = i_{E2} - i_1 = 5.2\ mA - 0.18\ mA = 5.02\ mA$$

$$i_{C0} = \frac{9-0.2}{4.4} = 2mA$$

$$i_{E0} = i_{C0} + i_{B0} = 7.02mA$$

$$P_{dis} = (9-1.6)\, i_{B1} + (9-2.3)\times i_{Ex} + (9-2.3)\, i_{Ey}$$

$$+ (1.6-0.8)\, i_{C1} + (9-0.8)\, i_{C2} + (0.8-0)\, i_1$$

$$+ (0.8-0)\, i_{BO} + (9-0)\, i_{CO}$$

$$= 7.4 + 0.67 + 0.67 + 0.96 + 32.8 + 0.144$$

$$+ 4.016 + 18$$

$$= 64.66 \text{ mW}$$

Verification:

For T_2,

$$B_{force} = \frac{I_{C2}}{I_{B2}} = \frac{4}{1.2} = 3.3 < B_f$$

(assumption correct)

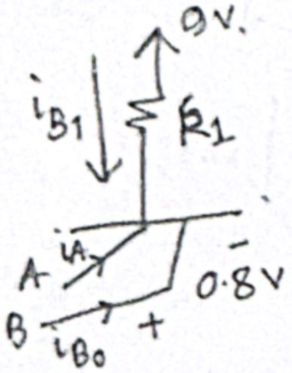
For T_3,

$$B_{force} = \frac{I_{CO}}{I_{BO}} = \frac{2}{5.02} = 0.398 < B_f$$

(assumption correct)

If $V_A = V_B = 0V$ then T_2, T_3 will go cut off mode due to insufficient voltage supply.

only T_1 will be ~~active~~ 'ON' and be in 'sat' mode.



Applying KCL at base, we get

$$i_{B1} = i_A + i_{B0}$$

$$\text{or } i_{B1} = i_A \times 2 \quad [\text{same}]$$

$$i_{B1} = \frac{9-0.8}{R_1}$$

$$i_A = i_{B0} = \frac{i_{B1}}{2} = \frac{1}{2} \cdot \frac{9-0.8}{R_1}$$

Given, $P_{dis} = 1.23 mW$,

Now,

$$P_{dis} = (9-0.8)\, i_{B1} + (0.8-0)\, I_A + (0.8-0)\, I_{B0}$$

$$\Rightarrow 1.23 = (9-0.8)\frac{(9-0.8)}{R_1} + 0.8\, I_A \times 2$$

$$\Rightarrow 1.23 = (9.08)\frac{9-0.8}{R_1} + 0.8 \cdot \frac{I_B}{\cancel{2}} \times \cancel{2}$$

$$\Rightarrow 1.23 = (9-0.8)\frac{9-0.8}{R_1} + 0.8 \cdot \frac{(9-0.8)}{R_1}$$

$$\Rightarrow 1.23 = \frac{9-0.8}{R_1}(9-\cancel{0.8}+\cancel{0.8})$$

$$\Rightarrow 1.23 = \frac{9-0.8}{R_1} \times 9$$

$$\therefore R_1 = 60k\Omega$$

So, the maximum value of R_1 is to $60 k\Omega$ to satisfy the given criteria.