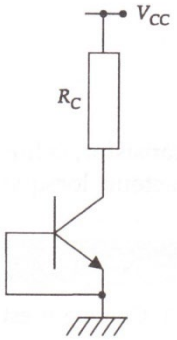
TD 4 : Bipolar transistors (Part 1)

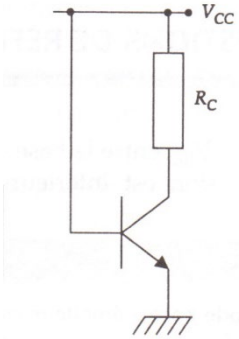
In this TD, we take V_{BE}= 0.7 V if the base-emitter junction is conducting

Exercise 1

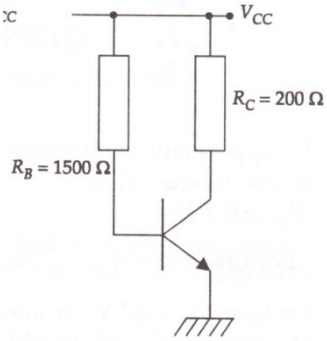
In the following diagrams, the transistor is not biased correctly to operate in the linear mode. Why ? Specify the operating mode. We will take V_{CC}= 10 V and β= 50.



a.

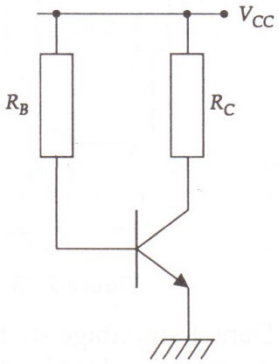


b.



c.

Exercise 2

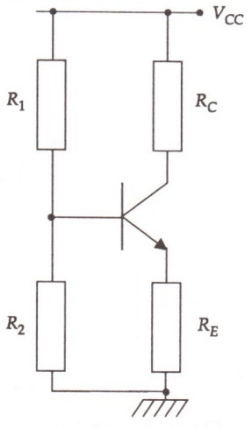


Consider the diagram opposite.
We have:

$R_B = 10k\Omega, R_C = 50\Omega, V_{cc} = 10V, V_{BE} = 0{,}7, V$ et $\beta = 100$.

Determine the polarization point of the transistor

Exercise 3

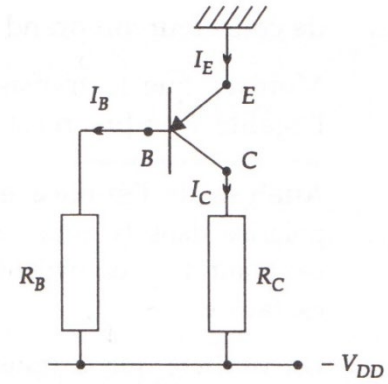


Consider the diagram opposite, in which R_2 = 10 kOhm.
Calculate the values of the 3 resistors R_1, R_C and R_E so that the point of polarization is characterized by the potentials V_B= 2 V, V_C = 6 V with a base current I_B = 100μA

We have $V_{CC} = 10V$ & $\beta = 100$

Exercise 4

Consider the diagram opposite.



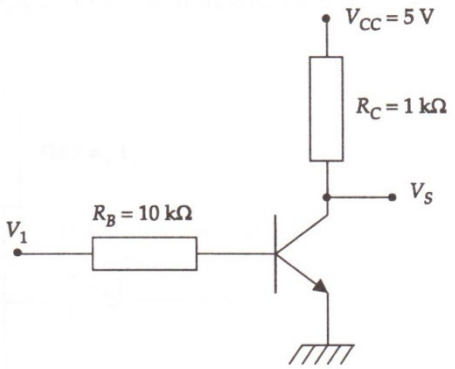
We have :

$R_B = 10k\Omega$, $R_C = 50\Omega$, $-V_{DD} = -10V$, $V_{BE} = -0{,}7, V$ et $\beta = 100$.

Determine the polarization point of the transistor

Exercise 5

Consider the diagram opposite

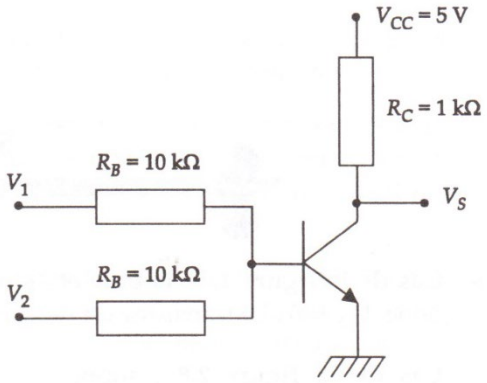


Consider the voltage V_S if V_1=0 V and V_1= 5V

With $\beta = 100$.

Exercise 6

Consider the diagram opposite.



Calculate V_S in the following cases

- ✓ $V_1 = V_2 = 0V$
- ✓ $V_1 = 5V$ et $V_2 = 0V$
- ✓ $V_1 = 0V$ et $V_2 = 5V$
- ✓ $V_1 = V_2 = 5V$

With $\beta = 100$.