Northern University Of Bangladesh

Experiment No-4: Emitter bias network

Name : Fardeen Ahmed
Id : 41210301615
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Section : A

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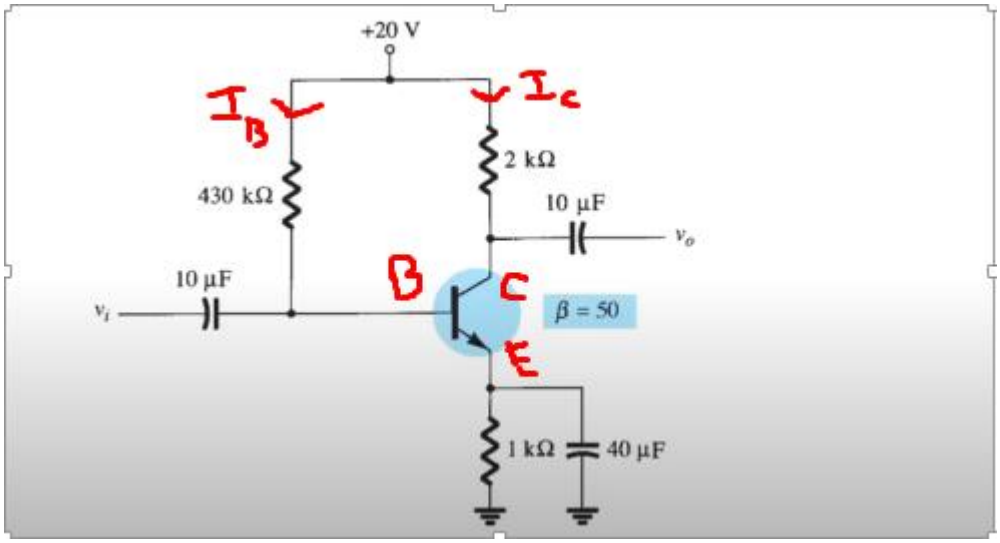
Transistor:

A transistor is a type of semiconductor device that can be used to conduct and insulate electric current or voltage. There are 3 parts of a transistor.

1) Base : This is used to activate the transistor.
2) Emitter : It is the negative lead of the transistor.
3) Collector : It is the positive lead of the transistor.

Lets consider this circuit



Here , V_{CC} = 20V
R_B = 430 kΩ
R_C = 2 kΩ
R_E = 1 kΩ
V_{BE} = 0.7
β = 224.5

Now,

$V_{CC}= I_BR_B + V_{BE} + I_ER_E$ ……i

$I_E= I_B + I_C$

$= I_B + \beta I_B$

$= (1+\beta)\ I_B$ ……ii

From i and ii

$V_{CC} = = I_BR_B + V_{BE} + (1+\beta)\ I_BR_E$

$V_{CC}-V_{BE}= I_B\ (R_B +(1+\beta)\ R_E)$

$I_B = (V_{CC}-V_{BE})\ /\ (R_B +(1+\beta)\ R_E)$

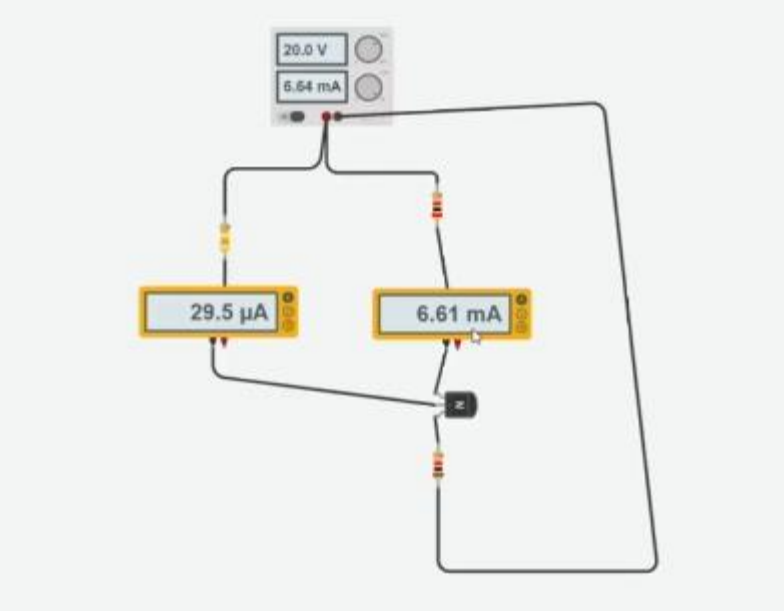
$= (20 – 0.7)\ /\ (430\ k\Omega + (1+ 224.5)\ 1\ k\Omega)$

$= 29.9\ \mu A$

$I_C = \beta I_B$

$= 224.5 \times 29.9$

$= 6.71$ mA



Here IB is 29.5 µA and IC is 6.61 mA. Which is closely of 29.9 µA and IC is 6.71 mA.

$V_{CC} = I_C R_C + V_{CE} + I_E R_E$

$V_{CE} = V_{CC} - I_C R_C - I_E R_E$

$= 20 - 6.61 \times 2\ k\Omega - 6.64 \times 1\ k\Omega$

$= 127$ mV