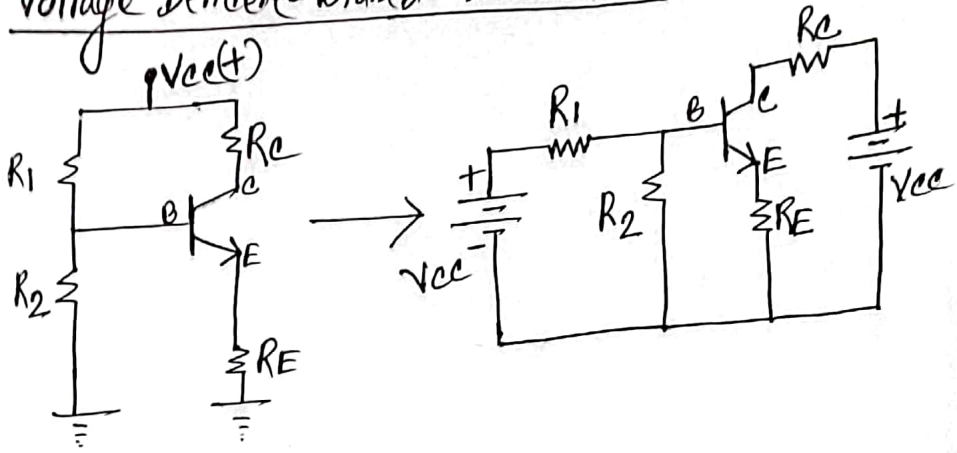
Voltage Devidere-Biased Transistore

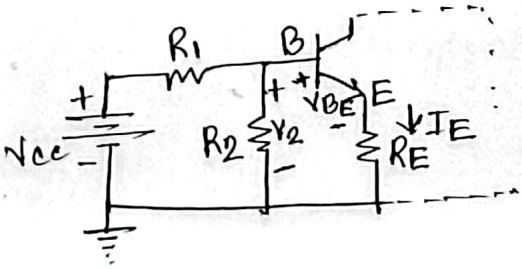


Ic Derivation ⇒

From Base (B) to Emitter (E) loop,

Applying voltage Devider Rule according R_2,

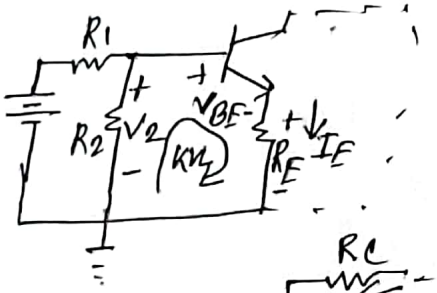
$$V_2 = \frac{R_2}{R_2 + R_1} \times V_{cc}$$



Applying KVL according to loop (B-E)

$$V_2 - V_{BE} - V_E = 0$$

$$V_E = I_E R_E$$



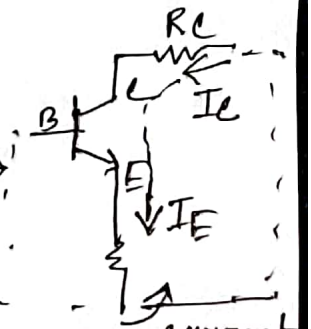
$$\Rightarrow V_2 - V_{BE} - I_E R_E = 0$$

$$\Rightarrow I_E R_E = V_2 - V_{BE}$$

$$\therefore \boxed{I_E = \frac{V_2 - V_{BE}}{R_E}}$$

So, $$\boxed{I_C = \frac{V_2 - V_{BE}}{R_E}}$$

while $I_E \simeq I_C$,



Same current flow in collector to Emitter loop so

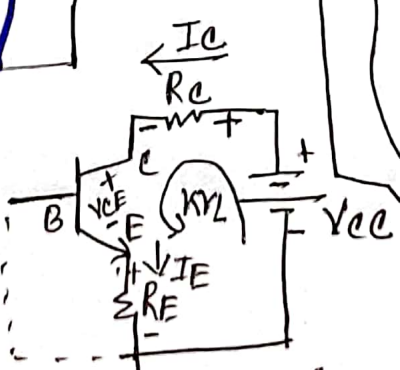
Vce Derivation ⇒

From Collector to Emitter loop,

Applying KVL in this loop,

$$V_{cc} - I_C R_C - V_{CE} - I_E R_E$$

$$\Rightarrow \boxed{V_{CE} = V_{cc} - I_C(R_C + R_E)}$$



while $I_C \simeq I_E$