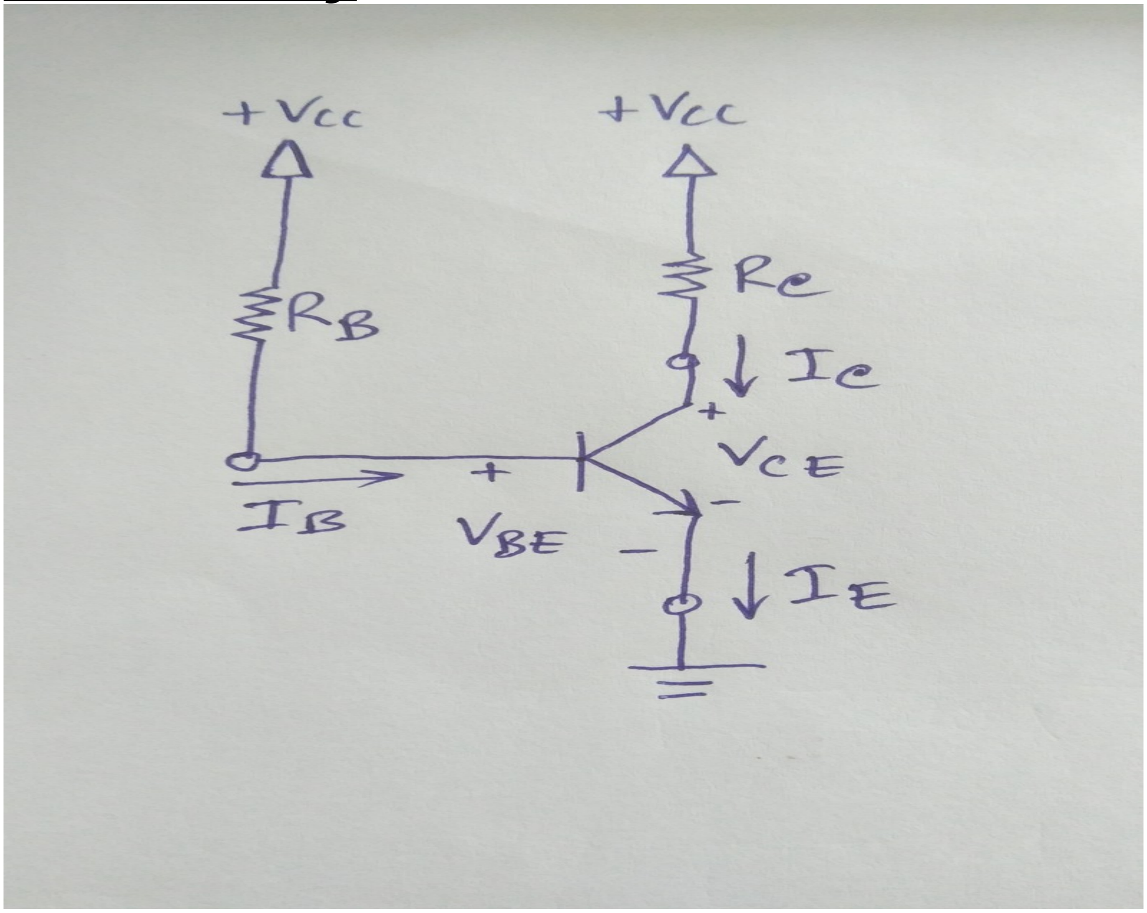
Class A fixed biasing:



Operating power,

$$P = P_{\max} \times \frac{n}{100}$$

And, $$P = V_{CE} I_C$$

So, $$I_C = \frac{P}{V_{CE}}$$

Therefore, $$I_B = \frac{I_C}{\beta}$$

Applying KVL to the input side,

$$V_{CC} = I_B R_B + V_{BE}$$

$$R_B = \frac{V_{CC} - V_{BE}}{I_B}$$

Applying KVL to the output side,

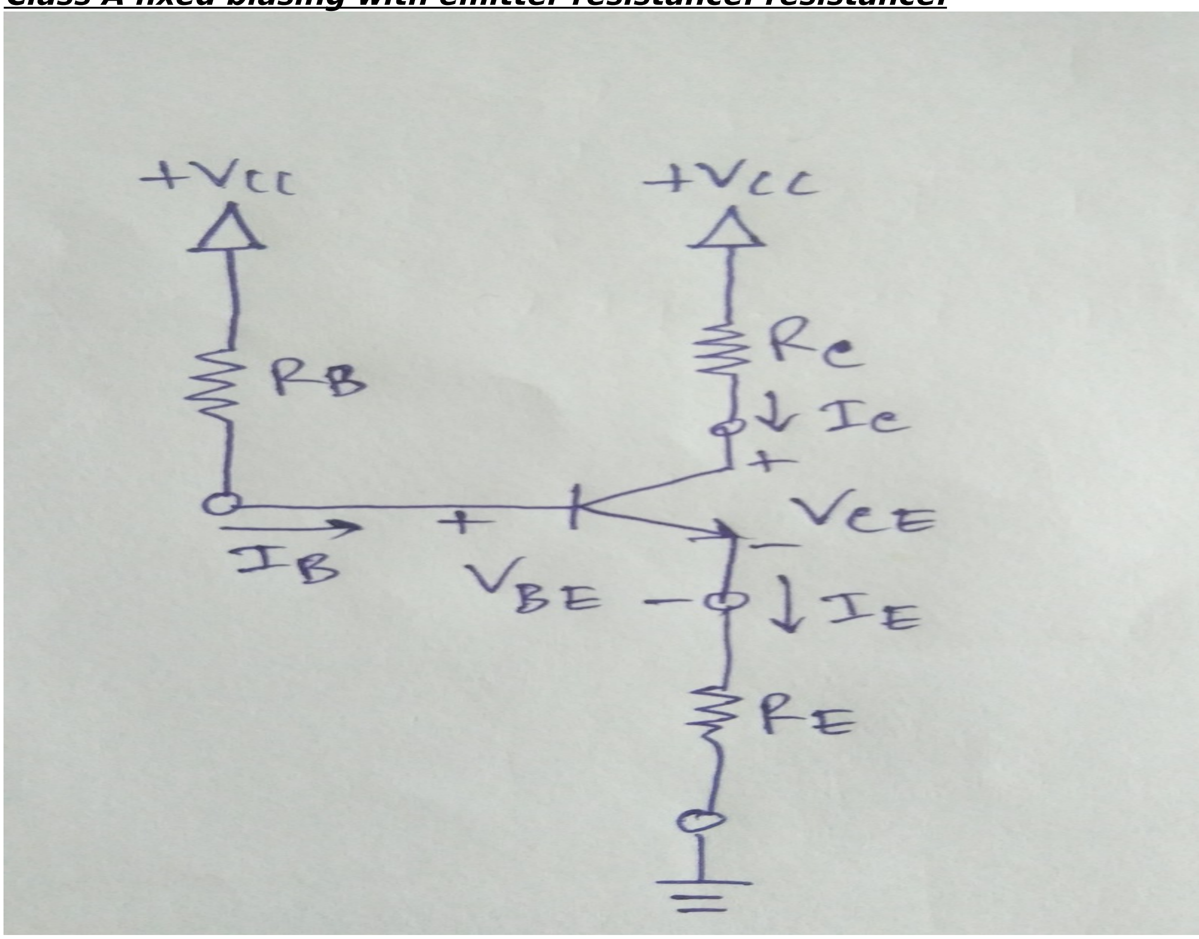
$$V_{CC} = I_C R_C + V_{CE}$$

So, $R_C = \frac{V_{CC} - V_{CE}}{I_C}$

We are fixing the operating point as $V_{CE} = \frac{1}{2}V_{CC}$

So I_C, R_C, R_B, I_B can be known.

Class A fixed biasing with emitter resistance: resistance:



$P = P_{\max} \times \frac{n}{100}$

And, $P = V_{CE} I_C$

So, $I_C = \frac{P}{V_{CE}}$

Therefore, $I_B = \frac{I_C}{\beta}$

Applying KVL to the input side,

$V_{CC} = I_B R_B + V_{BE}$

$R_B = \frac{V_{CC} - V_{BE}}{I_B}$

Applying KVL to the output side,

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

As, $I_C >> I_B$ and, $I_E = I_C + I_B$

So, $I_E \approx I_C$

Let, the collector voltage be $V_C = \frac{3}{4} V_{CE}$

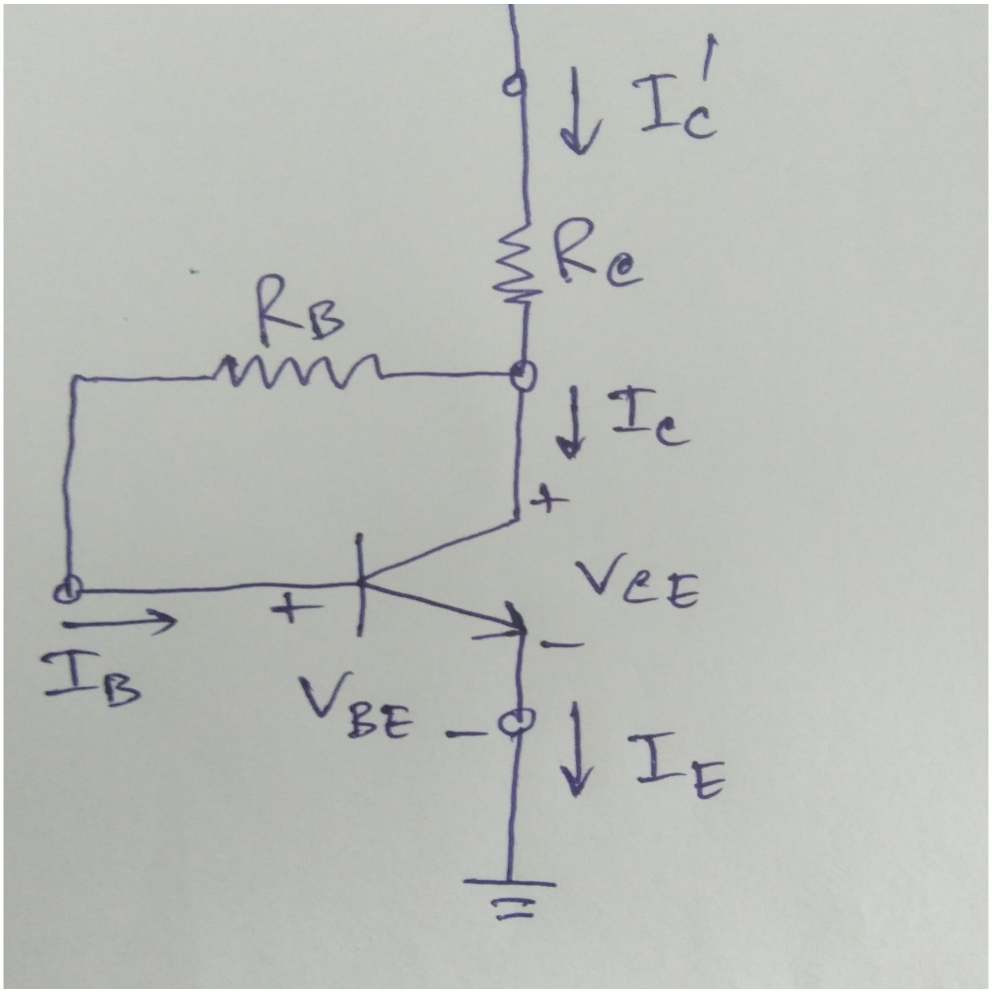
And, the emitter voltage be $V_E = \frac{1}{4} V_{CE}$

Where the operating point be $V_{CE} = \frac{1}{2} V_{CC}$

So, $R_C = \frac{3}{4} \frac{V_{CE}}{I_C}$ And, $R_E = \frac{1}{4} \frac{V_{CE}}{I_E} \approx \frac{1}{4} \frac{V_{CE}}{I_C}$

So I_C, R_C, R_B, I_B, R_E can be known.

Class A collector base feedback biasing:



$P = P_{\max} \times \frac{n}{100}$

And, $P = V_{CE} I_C$

So, $I_C = \frac{P}{V_{CE}}$ Therefore, $I_B = \frac{I_C}{\beta}$

As, $I_C >> I_B$ and, $I_C' = I_E = I_C + I_B$

So, $I_E \approx I_C$

Applying KVL to the output side,

$V_{CE} = I_B R_B + V_{BE}$

So, $R_B = \dfrac{V_{CE} - V_{BE}}{I_B}$

Where the operating point be chosen as $V_{CE} = \dfrac{1}{2} V_{CC}$

Applying KVL to the input side,

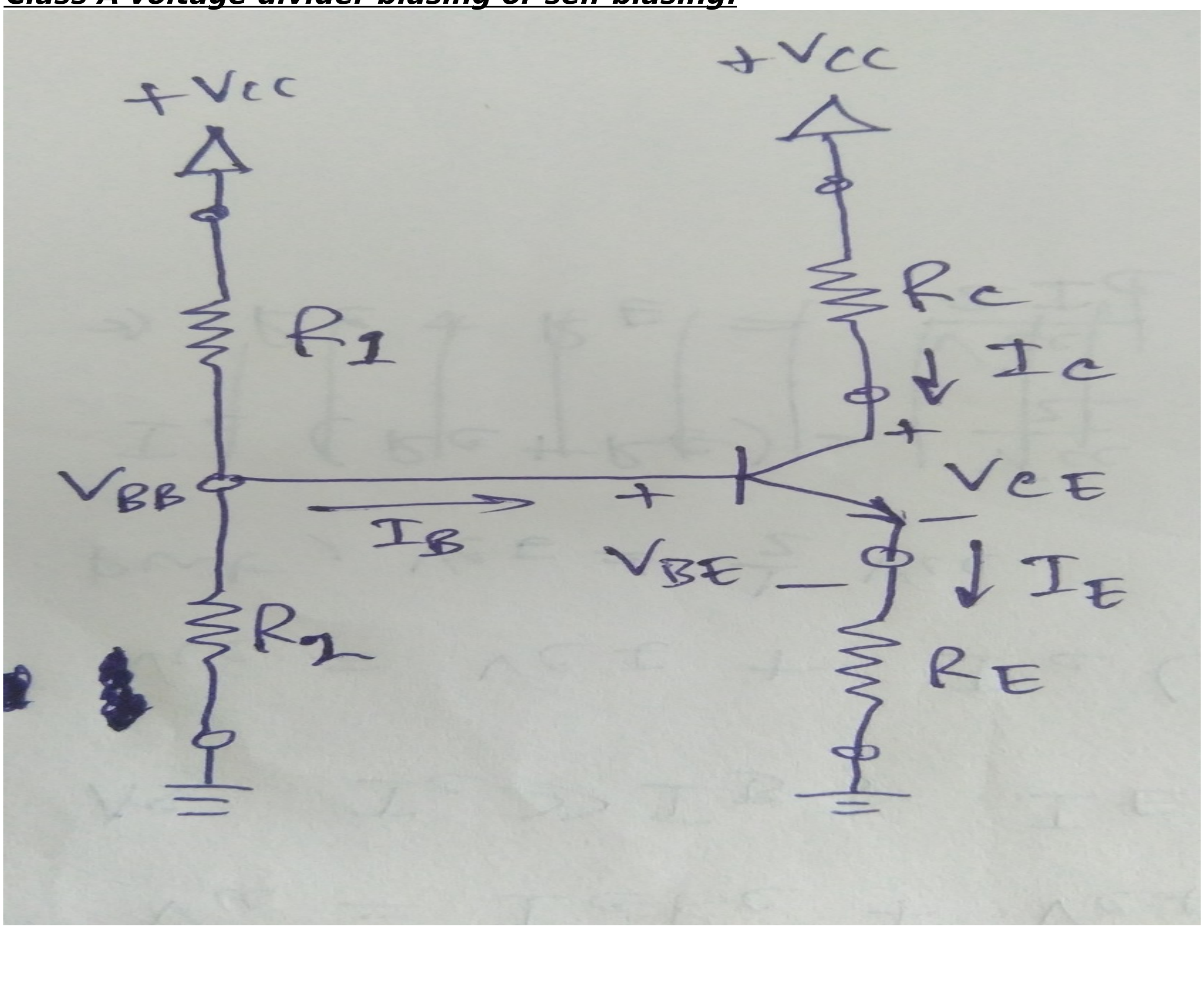
$V_{CC} = I_C' R_C + V_{BE} + I_B R_B$

$V_{CC} - V_{BE} = I_C R_C + \dfrac{I_C}{\beta} R_B$

$R_C = \dfrac{V_{CC} - V_{BE}}{I_C} - \dfrac{1}{\beta} R_B$

So I_C, R_C, R_B, I_B can be known.

Class A voltage divider biasing or self biasing:



$P = P_{max} \times \frac{n}{100}$

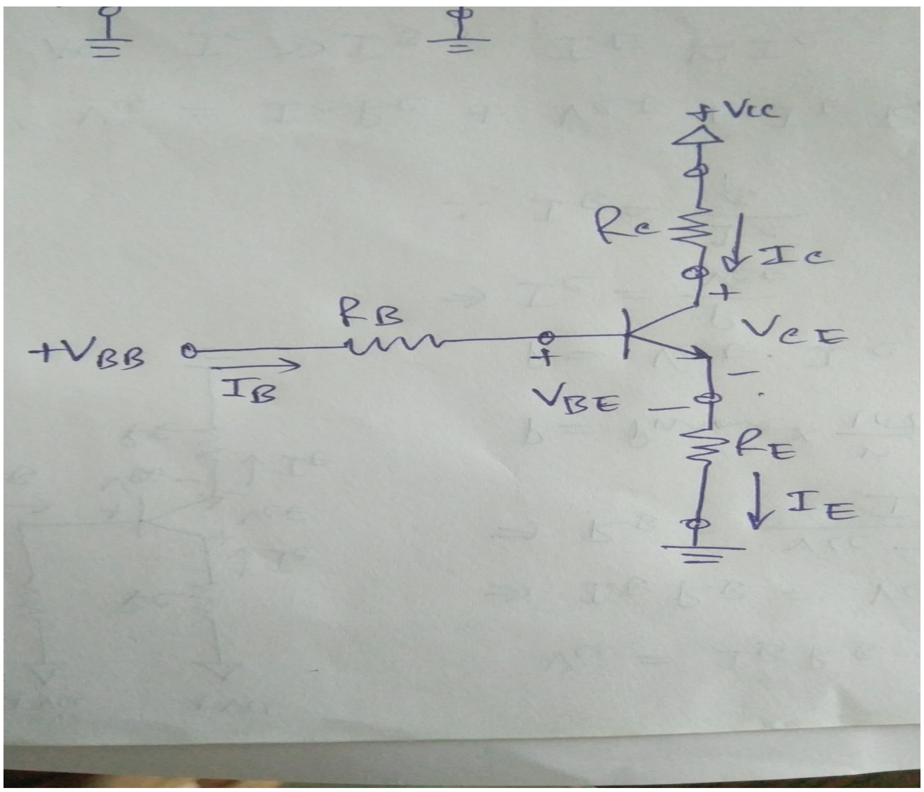
And, $P = V_{CE} I_C$

So, $I_C = \frac{P}{V_{CE}}$ Therefore, $I_B = \frac{I_C}{\beta}$

As, $I_C >> I_B$ and, $I_C' = I_E = I_C + I_B$

So, $I_E \approx I_C$

Where the operating point is set to be $V_{CE} = \frac{V_{CC}}{2}$



From Thevenin's theorem,

$V_{BB} = \frac{R_2 V_{CC}}{R_1 + R_2}$

And, $R_B = \frac{R_1 R_2}{R_1 + R_2}$

Applying KVL to the input side,

$V_{BB} = I_B R_B + V_{BE} + I_E R_E$

$$V_{BB} = I_B R_B + V_{BE} + I_C R_E$$

Let, the collector voltage be $V_C = \frac{3}{4} V_{CE}$

And, the emitter voltage be $V_E = \frac{1}{4} V_{CE}$

Where the operating point be $V_{CE} = \frac{1}{2} V_{CC}$

So, $R_C = \frac{3}{4} \frac{V_{CE}}{I_C}$ And, $R_E = \frac{1}{4} \frac{V_{CE}}{I_E} \approx \frac{1}{4} \frac{V_{CE}}{I_C}$

So I_C, R_C, R_B, I_B, R_E can be known.