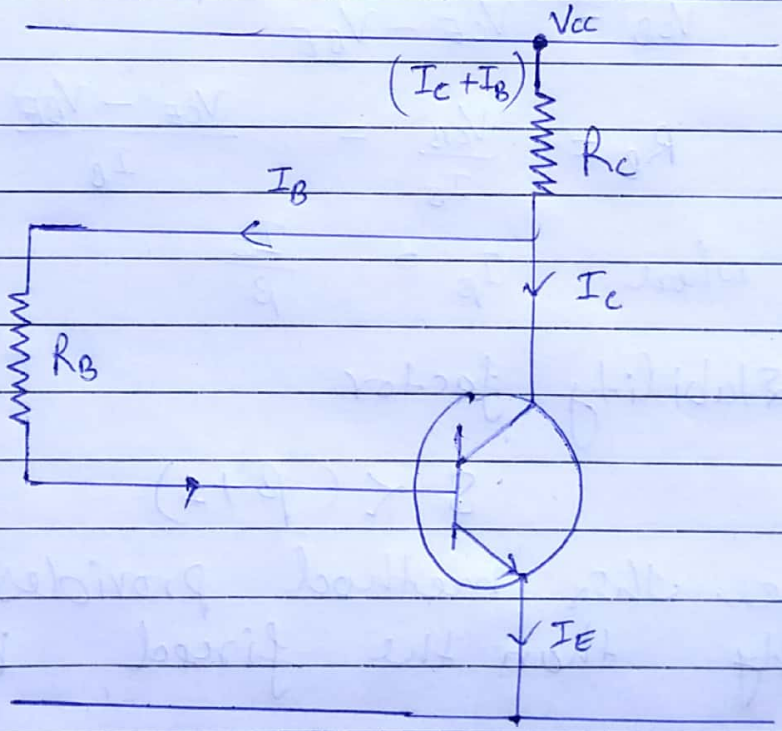
Dr. Mohammad Aslam, Dept. Of Physics.
B. Sc. Part-2, Physics (Hons), Paper-IV
Lecture-No-37

- Biasing with Collector Feedback resistor of transistor:

In this method, the base resistor R_B has its one end connected to the base and the other to the collector as its name implies. In this circuit the zero signal base current is determined by V_{CB} but not by V_{cc}.

It is clear that V_{CB} forward biases the base-emitter junction and base current I_B flows through R_B. This cause the zero signal collector current to flow in the circuit.



The required value of R_B needed to give the zero signal current I_C can be determined as follows.

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

or $$I_B R_B = V_{CC} - V_{BE} - I_C R_C$$

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

Since $I_C = \beta I_B$

Therefore, $$R_B = \frac{V_{CC} - V_{BE} - \beta I_B R_C}{I_B}$$

Alternatively,

$$V_{CE} = V_{BE} + V_{CB}$$

$$V_{CB} = V_{CE} - V_{BE}$$

$$R_B = \frac{V_{CB}}{I_B} = \frac{V_{CE} - V_{BE}}{I_B}$$

where, $$I_\beta = \frac{I_C}{\beta}$$

Stability factor,

$$S \propto (\beta + 1)$$

Therefore, this method provides better thermal stability than the fixed bias.

Advantages

- The circuit is simple as it needs only one resistor.
- This circuit provides some stabilization for lesser changes.

Disadvantages

- The circuit does not provide good stabilization.
- The circuit provides negative feedback.