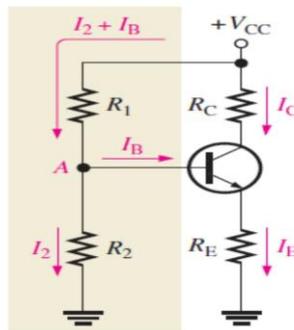




## Voltage Divider Bias

### Objective of the Experiment:

- To understand the method of biasing a transistor using a voltage divider.
- To measure the voltages and terminals of the transistor in the active region.
- To compare theoretical values with practical results.
- To understand the importance of stabilizing the operating point (Q-Point).



### Theoretical Background:

The BJT (Bipolar Junction Transistor) is used as a signal amplifier when operating in the active region. One of the most stable biasing methods is



the Voltage Divider Bias method because it reduces the effect of variations in the current gain ( $\beta$ ).

### Circuit Configuration

The circuit consists of:

- A DC voltage source (VCC)
  - Two resistors, R1 and R2, to form a voltage divider
  - A collector resistor (RC)
  - An emitter resistor (RE)
  - A transistor (such as 2N2222 or BC547).
- **Operating Principle:**
- - The voltage divider (R1 and R2) determines the base voltage:

$$V_B = V_{CC} \times \frac{R_2}{R_1 + R_2}$$

Then:

$$V_E = V_B - 0.7V$$

$$\text{Since: } I_E = R_E \times V_E$$



$$I_C \approx I_E$$

$$V_C = V_{CC} - I_C R_C$$

$$V_{CE} = V_C - V_E$$

For the transistor to operate as an amplifier, it must satisfy:

$$V_{CE} > 0.2V$$

## Procedure

- Assemble the circuit on a breadboard.
- Ensure that all connections are correct.
- Connect the 12V power supply.

Measure the following:

- Base voltage ( $V_B$ )
- Emitter voltage ( $V_E$ )
- Collector voltage ( $V_C$ )
- Calculate ( $V_{CE}$ ).
- Record the results in a table.

- **Readings Table**



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**Voltage Measured Value Theoretical Value**

VB	.....	.....
VE	.....	.....
VC	.....	.....
VCE	.....	.....

**Discussion Questions**

- Why is the Voltage Divider method considered more stable?
- What happens if RE is removed?
- What happens if the value of RC is greatly increased?
- How do we set the operating point at the middle of the load line?