Exp.2: Voltage Divider DC Biasing of BJT Transistor Circuits

The objective of the experiment is to identify the mode of transistor operation by identifying the Base Emitter (B-E) p-n junction and Collector Base (B-C) p-n junction biasing as Forward and reverse biasing.

To study the given voltage Divider Biasing circuit using R_1= 82 k-Ohm, R_2= 39 k-Ohm, R_C= 1k-Ohm V_{CC}= 10 V and V_{EE}=0 V (ground). Build the circuit on breadboard, set the R_E (given fixed resistors or 10k Potentiometer) to minimum resistance value (, note its value) and measure the other parameters such as I_c, $V_{BE,}$ V_{BC} and V_{CE} using multimeter in proper mode and polarity to complete Table-1.

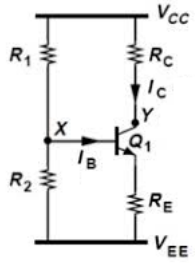

Fig.1. Voltage Divider BJT Circuit

- Measure various DC operating conditions as mentioned in the table below **and verify Thevenin's equivalent circuit for the given circuit with highlighted row in grey.**

Table:1

R_E (ohm)	I_C (mA)	V_{BE} (V)	V_{BC} (V)	V_{CE} (V)	B-E Junction biasing type (FB/RB)	B-C Junction biasing type (FB/RB)	Mode of operation (Active/ Saturation/Cutoff)
0.1 k							
0.2 k							
1 k							
5 k							
10 k							

- **Now replace the R_E with 1 M-ohm fixed resistance and replace the R_2 with 10 k-ohm potentiometer.**

Table:2

R_2 (ohm)	I_C (mA)	V_{BE} (V)	V_{BC} (V)	V_{CE} (V)	B-E Junction biasing type (FB/RB)	B-C Junction biasing type (FB/RB)	Mode of operation (Active/ Saturation/Cutoff)
0.1 k							
5 k							

10k							

- **Thevenin's equivalent circuit and its verification (For original circuit with** R_1= 82 k-**Ω, R_2= 39 k-Ω, R_C= R_E =1k-Ω, V_{CC}= 10 V and V_{EE}=0 V)**
  Implement a Thevenin's equivalent circuit given in Fig.2. Complete the measurements and fill in Table-3. Then verify your findings from the previous measurements from the original circuit to confirm the equivalence of the two circuits.

R_{TH}= R1*R2/(R1+R2)=……..≈……(use available resistor)

V_{TH}= V_{cc}*R2/(R1+R2)=……V

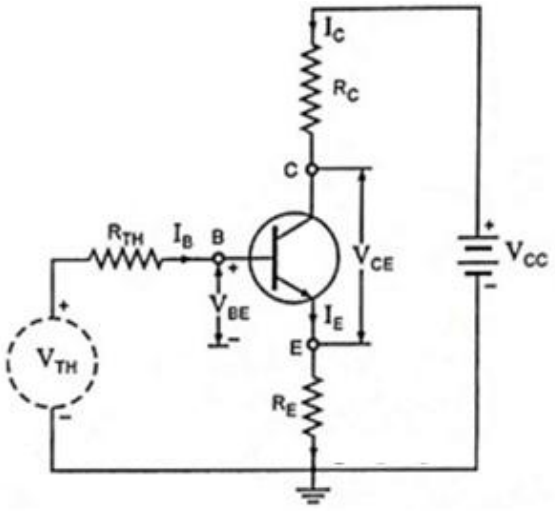

Fig. 2: Thevenin's equivalent of circuit given in Fig.1.

Table:3

I_C (mA)	V_{BE} (V)	V_{BC} (V)	V_{CE} (V)	B-E Junction biasing type (FB/RB)	B-C Junction biasing type (FB/RB)	Mode of operation (Active/ Saturation/Cutoff)

Result and conclusion: