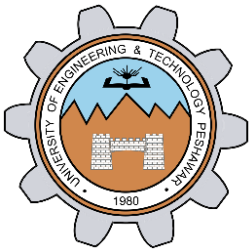
Lab Report - 10

BJT BIASING CIRCUITS Voltage-Divider-Bias Configuration



Spring-24

CSE-206L Electronics Circuits Lab

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Registration No: **22PWCSE2144**

Section: **A**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Submitted to:

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Objectives:
To determine the quiescent operating conditions of the fixed-bias BJT configuration.

Components:

- Resistors: 680Ω, 1.8 kΩ, 6.8 kΩ, 33 kΩ
- Transistors: 2N3904, 2N4401
- DC Power Supply
- DC Ammeter
- DC Voltmeter

Procedure:
1. Measure all resistor values (R1, R2, RB and RC) from circuit in Fig. 1
2. Using the β determined for 2N3904 transistor in Part B, calculate the theoretical values of VB, VE, IE, IC, VC, VCE and IB for the network shown in Fig. 1. Record them in Table
3. Construct the network of Fig. 1 and measure VB, VE, VC and VCE. Record them in Table.

Transistor 2N3904:

$I_B = 1.22mA$

$I_C = 4.85mA$

$V_{CE} = V_{CC} - I_C (R_C + R_E)$

$V_{CE} = 20 - 0.00485A(1800 + 680)$

$V_{CE} = 7.972\ V$

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

$$\beta = \frac{4.85}{1.22} = 3.975$$

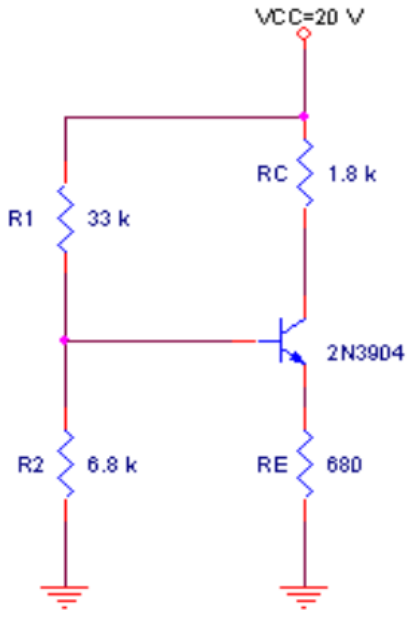
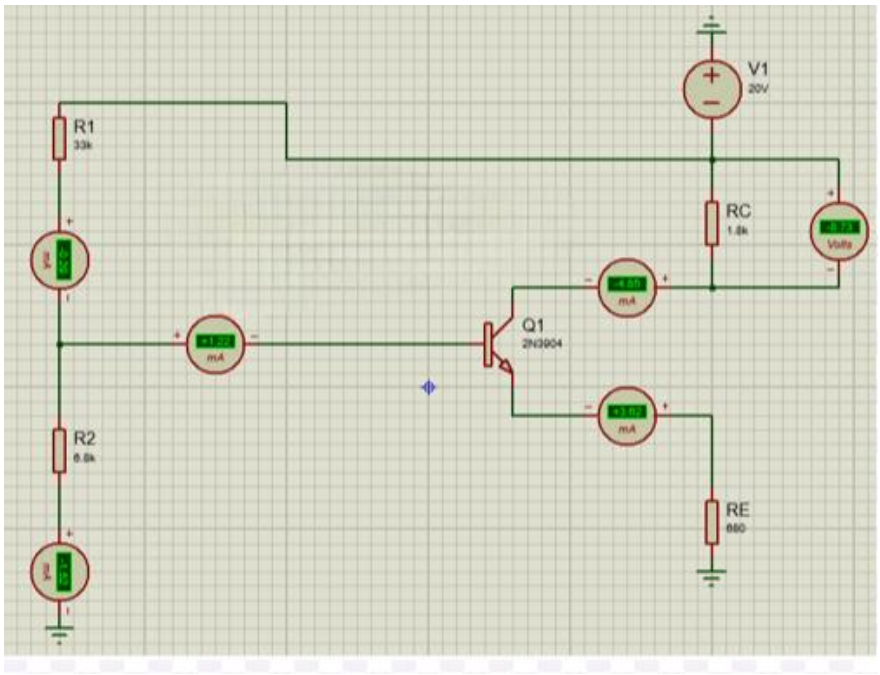


Fig-1


V1
20V
R1
33k
RC
1.8k
Q1
2N3904
R2
6.8k
RE
680

Transistor 2N2222:

$I_B = 1.22mA$

$I_C = 4.88mA$

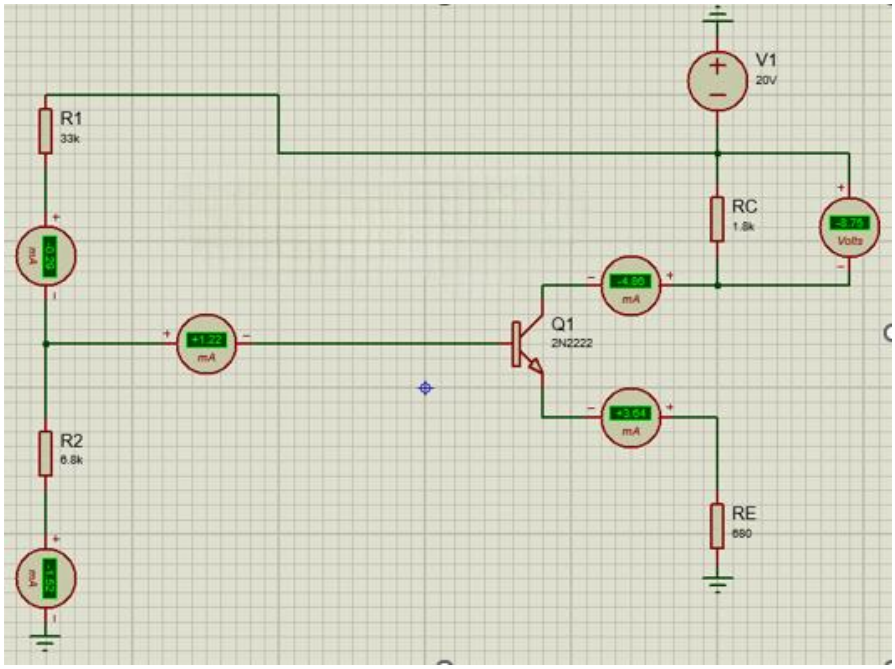
$V_{CE} = V_{CC} - I_C (R_C + R_E)$

$V_{CE} = 20 - 0.00488(1800 + 680)$

$V_{CE} = 7.897V$

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

$$\beta = \frac{4.88mA}{1.22mA} = 4$$



% Changes:

$$\%\Delta\beta = \frac{|\beta_{2N2222} - \beta_{2N3904}|}{|\beta_{2N3904}|} \times 100 \Rightarrow \frac{4 - 3.97}{3.97} \times 100$$

$$\%\Delta\beta = 0.75\%$$

$$\%I_C = \frac{\left|I_{C\ (2222)} - I_{C\ (3904)}\right|}{|I_{C(3904)}|} \times 100 \Rightarrow \frac{4.88 - 4.85}{4.85} \times 100$$

$$\%I_C = 0.61\%$$

$$\%V_{CE} = \frac{\left|V_{CE(2222)} - V_{CE(3904)}\right|}{\left|V_{CE\ (3904)}\right|} \times 100 \Rightarrow \frac{7.897 - 7.972}{7.972} \times 100$$

$$\%V_{CE} = 0.94\%$$