

BAŞKENT UNIVERSITY

EEM 214 LABORATORY WORK

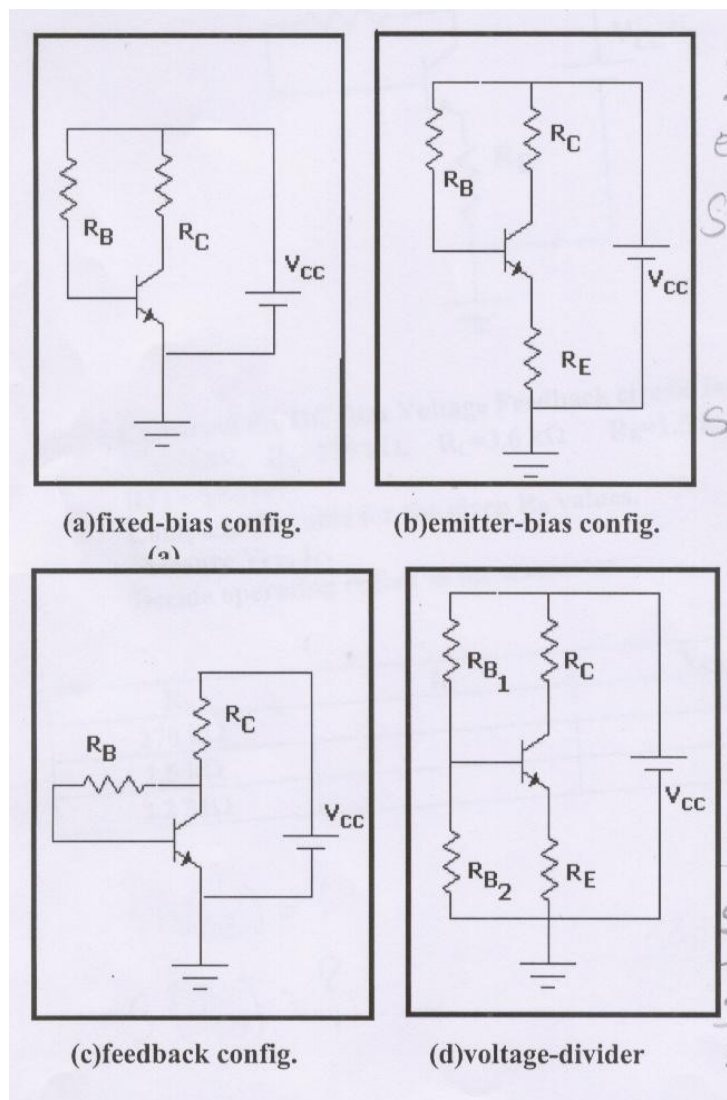
EXPERIMENT 7

COMPARING DIFFERENT BIAS CONFIGURATIONS

OBJECTIVES

- 1.) To compare different bias configurations
- 2.) To determine the stability factors of BJT circuits

1. THEORY & PRELIMINARY PART



In figures, different types of bias configurations are given. The values are:

$$V_{CC} = 30V \quad \beta = 100$$

$$R_B = 470k\Omega \quad R_C = 4.7k\Omega \quad R_{E1} = 1.2k\Omega \quad R_{B2} = 5.6k\Omega$$

Find I_B (Base current) and V_{CE} (collector-emitter voltage) of all configurations.

Calculate stability factors $S(I_{CO})$, $S(V_{BE})$ of all configurations then decide which configuration is more stable (robust). Explain why?

In your calculations, you can use below formulas:

Stability Factors:

Emitter – bias configuration:

$$S(V_{BE}) = \frac{\Delta I_C}{\Delta V_{BE}} = \frac{-\beta}{R_B + (\beta + 1)R_E}$$

$$S(I_{CO}) = (\beta + 1) \frac{1 + R_B/R_E}{(\beta + 1) + R_B/R_E}$$

Fixed – bias configuration:

$$S(V_{BE}) = -\frac{\beta}{R_B}$$

$$S(I_{CO}) = \beta + 1$$

Voltage Divider:

$$S(V_{BE}) = \frac{-\beta}{R_{th} + (\beta + 1)R_E}$$

$$S(I_{CO}) = (\beta + 1) \frac{1 + R_{th}/R_E}{(\beta + 1) + R_{th}/R_E}$$

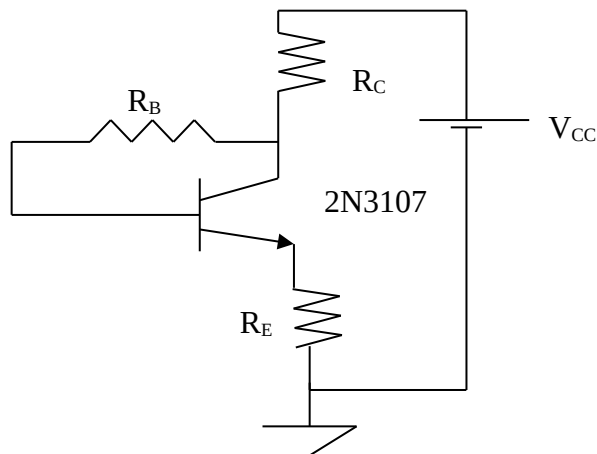
Feedback Configuration:

$$S(V_{BE}) = \frac{-\beta}{R_B + (\beta + 1)R_C}$$

$$S(I_{CO}) = (\beta + 1) \frac{1 + R_B/R_C}{(\beta + 1) + R_B/R_C}$$

2. EXPERIMENT PART

- 2.1) Construct the DC Bias Voltage Feedback circuit for the given elements:
- 2.2) $V_{CC} = 16\text{ V}$, $R_B = 270\text{ k}\Omega$, $R_C = 3.6\text{ k}\Omega$ $R_E = 1.5\text{ k}\Omega$
BJT = 2N3107
- 2.3) Measure V_{CE} , I_C values.
- 2.4) Complete the table-1 for the given R_B values.
- 2.5) Decide operating region of the transistor.
- 2.6) Calculate the Stability Factors for the values given in report



3. RESULTS AND CONCLUSION

- 3.1) Which circuitry is more stable.
- 3.2) Examine the stabilization factors and give some comments on results

4. REPORT

Name :
Surname :
Id Number :
Lab Section :

$h_{FE} =$

R_B	I_C	V_{CE}	Operating Region
270 k Ω			
1.5 k Ω			
2.2 k Ω			

Table – 1

$R_B = 270 \text{ k}\Omega$

$S(V_{BE}) =$

$S(I_{CO}) =$

$R_B = 1.5 \text{ k}\Omega$

$S(V_{BE}) =$

$S(I_{CO}) =$

$R_B = 2.2 \text{ k}\Omega$

$S(V_{BE}) =$

$S(I_{CO}) =$

