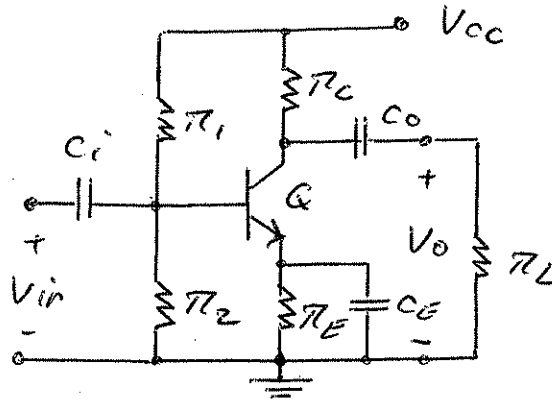


# CE Amplifier Design

## Circuit



$$\text{BJT: } \left| \begin{array}{l} \beta = 100 \div 300 \\ V_{BE} \approx 0.7V \\ V_A = 60V \end{array} \right|$$

$$\left| \begin{array}{l} V_{CC} = 10V \\ R_L = 10k\Omega \end{array} \right|$$

Select the 4 resistors  $R_1, R_2, R_E$  and  $R_C$  such that

$$R_{in} > 1k\Omega$$

$$R_{out} < 2k\Omega$$

$$|A_v| \approx 100$$

$$A_v = \frac{V_o}{V_{in}}$$

## Possible Solution

$$I_{CQ} \approx 2mA \quad \text{Choice}$$

$$\left. \begin{array}{l} R_1 = 27k\Omega \\ R_2 = 10k\Omega \end{array} \right\} R_B \approx 7.3k\Omega$$

$$R_E = 1k\Omega$$

$$R_C = 2k\Omega$$

$$\left| \begin{array}{l} \beta = 150 \\ I_{CQ} = 1.9mA \\ V_{CEQ} = 4.3V \end{array} \right|$$

## AC Performance

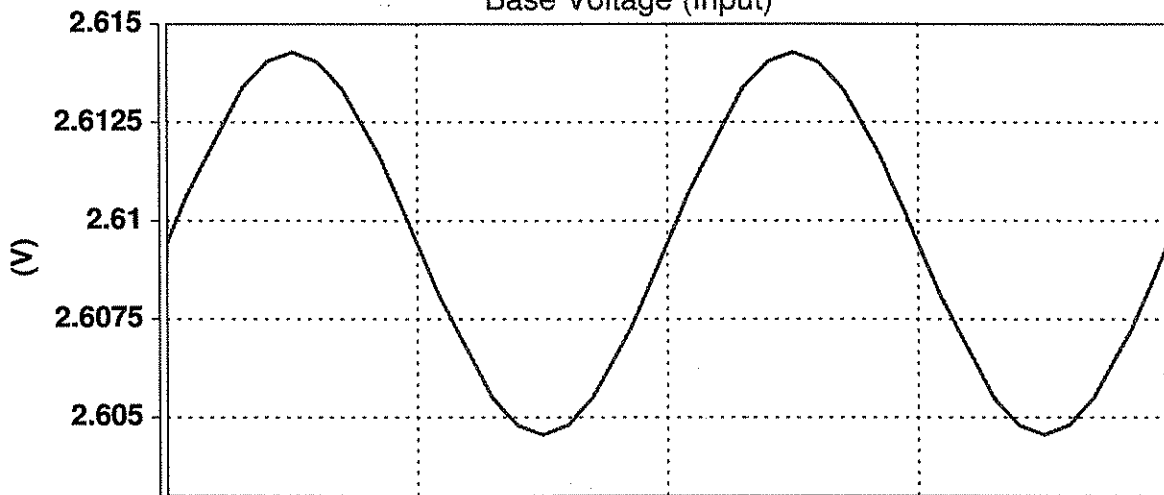
$$\left| \begin{array}{l} R_{in} \approx 1.8k\Omega \\ R_{out} \approx 1.9k\Omega \\ |A_v| \approx 101 \end{array} \right|$$

## $\beta$ Variation

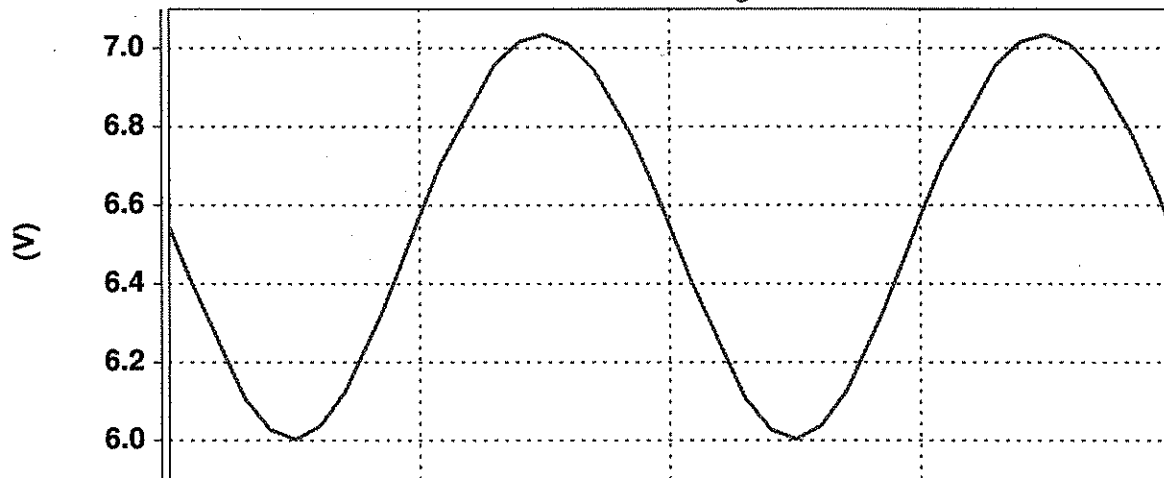
$$\left| \begin{array}{l} 1.86mA < I_{CQ} < 1.95mA \\ 1.3k\Omega < R_{in} < 2.8k\Omega \\ 99 < A_v < 104 \end{array} \right|$$

# CE Amplifier with Voltage Gain of 100

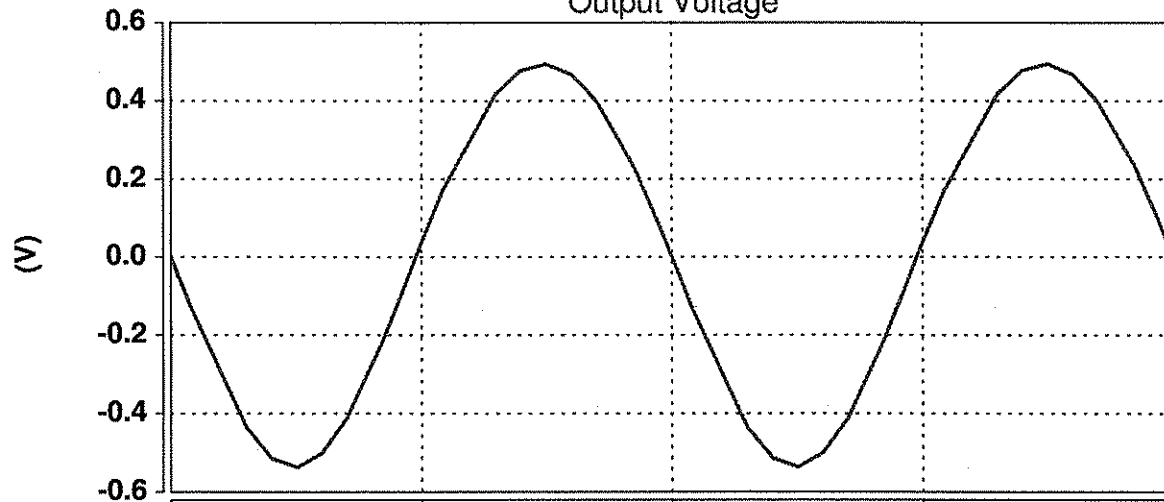
## Base Voltage (Input)



## Collector Voltage



## Output Voltage



2.0m

2.5m

3.0m

3.5m

t(s)