

Lab 8 Pre-lab

$$1) I_L = \frac{V_{PP}}{R_L}$$

$$I_L = \frac{4.6V_{PP}}{6.8k} \approx 676.47\mu A$$

$$2) \text{ set } I_C = 2.5 * I_L$$

$$I_C = (2.5)(676.47)\mu A$$

$$I_C \approx 1.69mA$$

$$3) \frac{V_{CC}}{2} = V_{CC} - R_C I_C$$

$$5 \approx 10 - R_C(1.69mA)$$

$$5 \approx R_C(1.69mA)$$

$$R_C \approx 2.957k\Omega$$

$$4) 1V \approx I_C (R_{EA} + R_{EB})$$

$$591.3 \approx R_{EA} + R_{EB} \approx R_E$$

$$5) 40 \frac{V}{V} = \frac{2.957k}{R_{EA}}$$

$$R_{EA} = \frac{2.957k}{40} = 73.913\Omega$$

$$6) R_{EB} = 591.3 - 73.913 = 517.39\Omega$$

$$7) V_B = V_E + V_{BE} = 1V + .7 = 1.7V$$

$$8) I_B = \frac{I_C}{\beta}$$

worst case $\beta \approx 225$

$$I_B = \frac{1.69mA}{225} \approx 7.511\mu A$$

$$9) V_B = \frac{R_2}{R_1 + R_2} \cdot V_{CC}$$

$$(.17)^{-1} = \frac{R_1}{R_2}, \quad 4.8824 = \frac{R_1}{R_2}$$

$$R_1 = R_2 \cdot 4.8824$$

check $\frac{V_{CC}}{R_1 + R_2} \gg I_B$ by about 10 fold

$$591.94\mu A \gg 7.511\mu A$$

50 fold

$$R_{in} = \left(\frac{1}{R_1} + \frac{1}{R_2} \right)^{-1}$$

$$3.6k = \left(\frac{1}{4.8824R_2} + \frac{1}{R_2} \right)^{-1}$$

$$(3.6k)^{-1} = \frac{1}{4.8824R_2} + \frac{1}{R_2}$$

$$R_2(3.6k)^{-1} = \frac{1}{4.8824} + 1$$

$$R_2(3.6k)^{-1} = 1.2048173$$

$$R_2 = 4.3373k\Omega$$

$$R_1 = 21.17664k\Omega$$

CE5 specs:

$$R_L \quad 6.8k \quad \pm 5\%$$

$$A_v \quad 40 \frac{V}{V} \quad \pm 10\%$$

$$V_{CC} \quad 10V \quad \pm 5\%$$

$$V_{out,max} \quad 4.6V_{p-p} \quad \geq$$

$$R_{in} \quad 3.6k \quad \geq$$