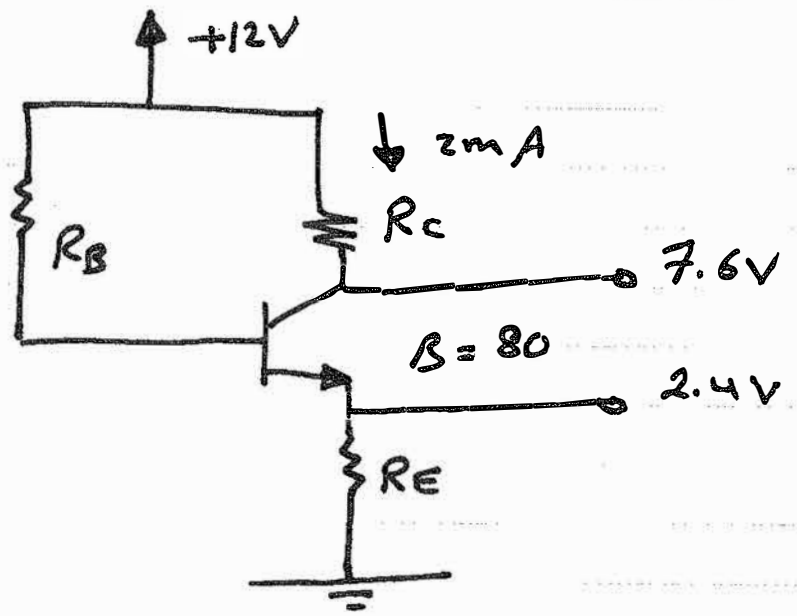
10



$I_C = 2mA$

$I_E = I_C + I_B = 2mA + \frac{2mA}{80} = 2.025mA$

$V_E = 2.4 = R_E I_E$

$\therefore R_E = \frac{2.4}{2.025} = 1.185K$

$R_C = \frac{12 - 7.6}{2mA} = 2.2K$

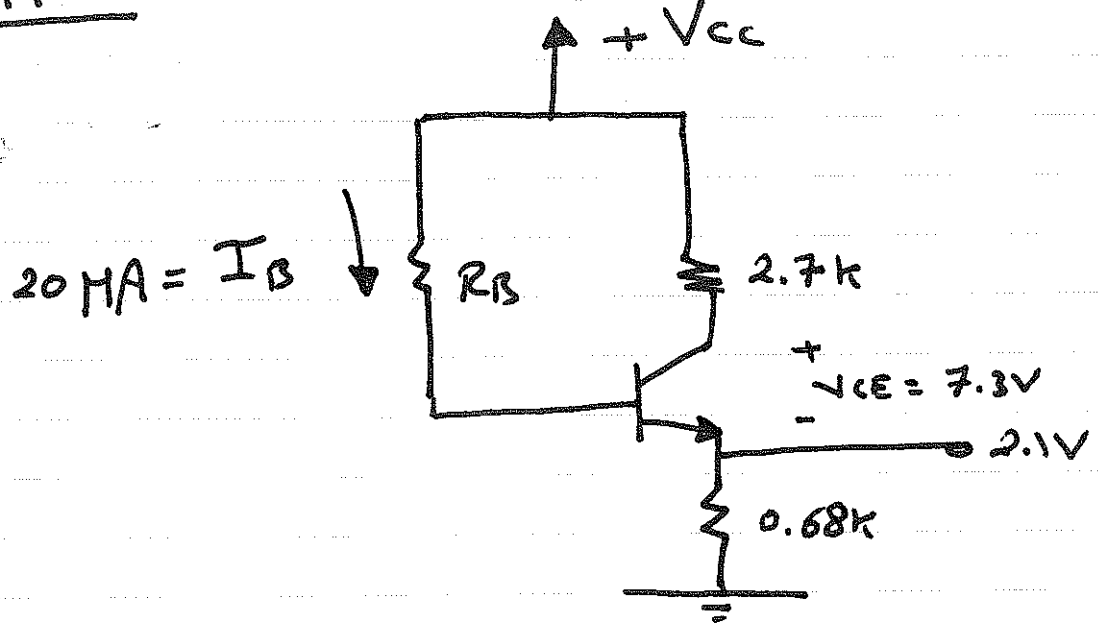
$12 = R_B I_B + V_{BE} + V_E$

$\therefore R_B = \frac{12 - 2.4 - 0.7}{\frac{2mA}{80}} = 356K$

$V_{CE} = V_C - V_E = 5.2V$

$V_B = V_{BE} + V_E = 3.1V$

11



$$\beta = \frac{I_E}{I_B} - 1$$

$$I_E = \frac{V_E}{0.68K} = \frac{2.1}{0.68} = 3.088\,mA$$

$$\therefore \beta = \frac{3.088\,mA}{20\,MA} - 1 = 153.4$$

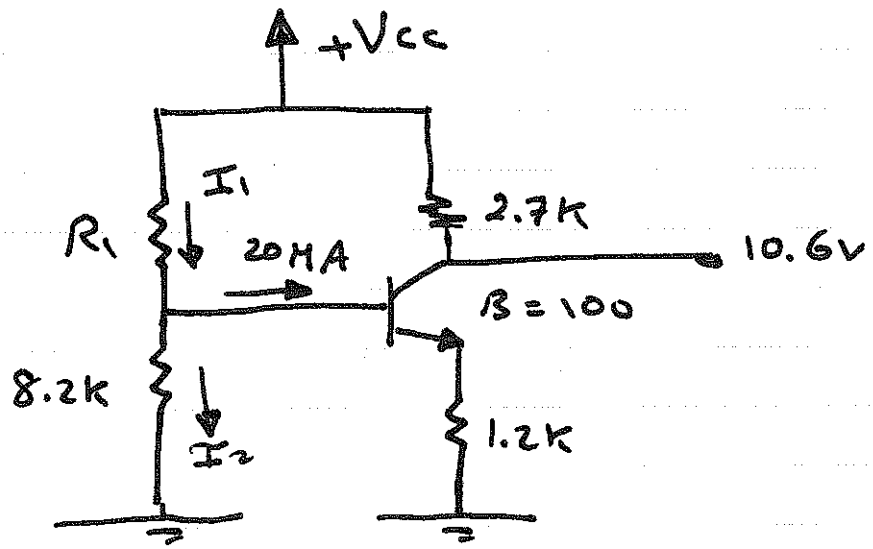
$$I_C = \beta I_B = 3.068\,mA$$

$$V_{cc} = (2.7K)I_C + V_{CE} + V_E = 17.68\,V$$

$$V_{cc} = R_B I_B + V_{BE} + V_E$$

$$\therefore R_B = \frac{V_{cc} - V_E - V_{BE}}{I_B} = 744.18\,K$$

18



$I_C = \beta I_B = 2mA$

$I_E = I_C + I_B = 2.02mA$

$V_E = (1.2K)(2.02mA) = 2.424V$

$V_{CE} = V_C - V_E = 10.6 - 2.424 = 8.176V$

$V_{cc} = 2.7K\, I_C + 10.6 = 16V$

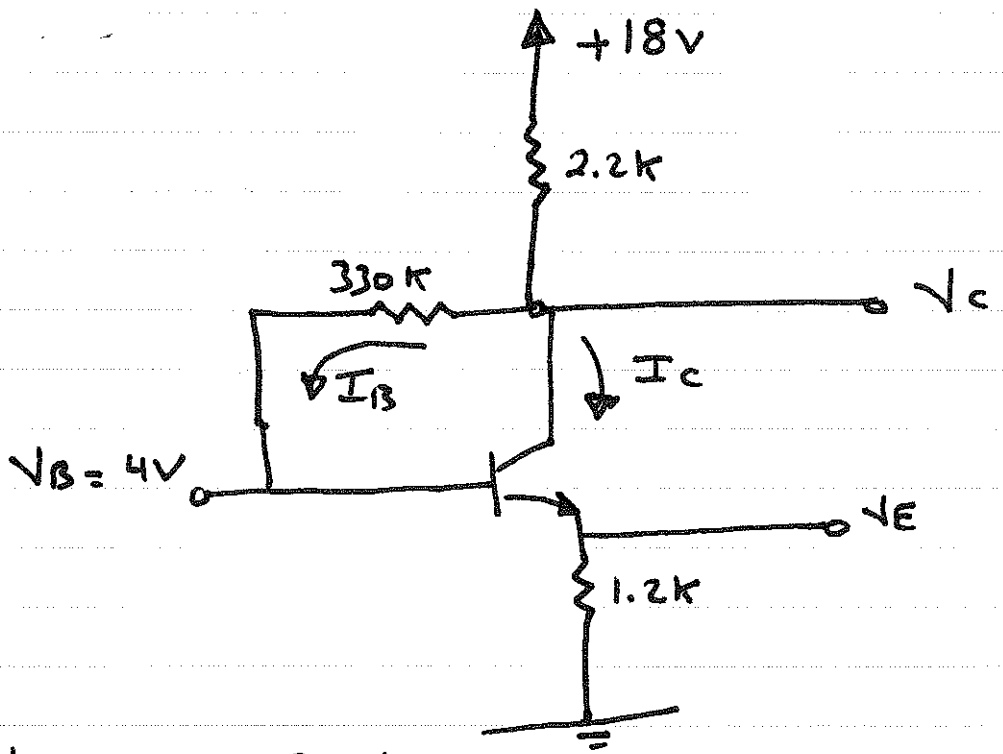
$V_B = V_{BE} + (1.2K)(I_E) = 3.124V$

$I_2 = \frac{V_B}{8.2K} = 0.381mA$

$I_1 = I_2 + I_B = 0.4mA$

$R_1 = \frac{V_{cc} - V_B}{I_1} = 32.11K$

33



$V_B = 4V = 0.7 + V_E$

$\therefore V_E = 3.3V$

$$I_E = \frac{V_E}{1.2K} = 2.75\,mA$$

$V_{CC} = (2.2K)(I_B) + 330K\,I_B + V_B$

$\therefore I_B = 0.0241\,mA$

$$\frac{I_E}{I_B} = \beta + 1$$

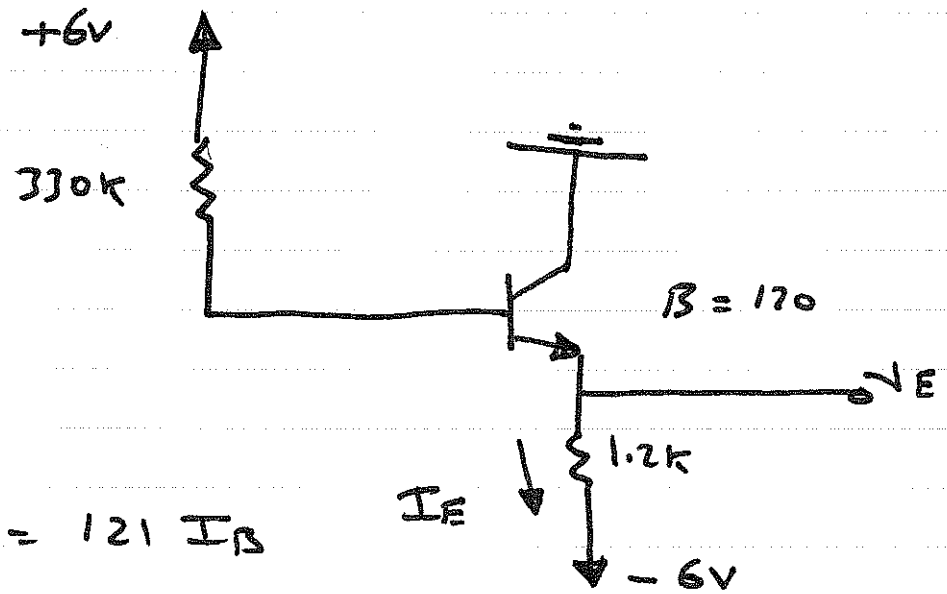
$\therefore \beta = 113.15$

$I_C = \beta I_B = 2.726\,mA$

$V_C = 18 - (2.2K)(2.75) = 11.95$

$V_{CE} = V_C - V_E = 8.65V$

34



$I_E = 121\, I_B$

$6 = 330K\, I_B + V_{BE} + 1.2K\, I_E - 6$

$$\therefore I_E = \frac{12 - 0.7}{1.2K + \frac{330K}{121}} = 2.88\ mA$$

$$V_E = (1.2K) I_E - 6 = -2.55\ V$$

43

$$V_E = \frac{1}{8} V_{CC} = 3V$$

$$R_E = \frac{V_E}{I_E}$$

$$I_E = I_C + I_B$$

$$\therefore R_E = \frac{3V}{4mA + \frac{4mA}{110}} = 0.743K$$

$$R_{TH} = \frac{(\beta+1) R_E}{10} = 8.25K$$

$$I_E = \frac{V_{TH} - 0.7}{R_E + \frac{R_{TH}}{\beta+1}}$$

$$\therefore V_{TH} = 3.97V$$

$$R_{TH} = \frac{R_1 R_2}{R_1 + R_2} = 8.25k$$

$$V_{TH} = \frac{R_2}{R_1 + R_2} = 3.97V$$

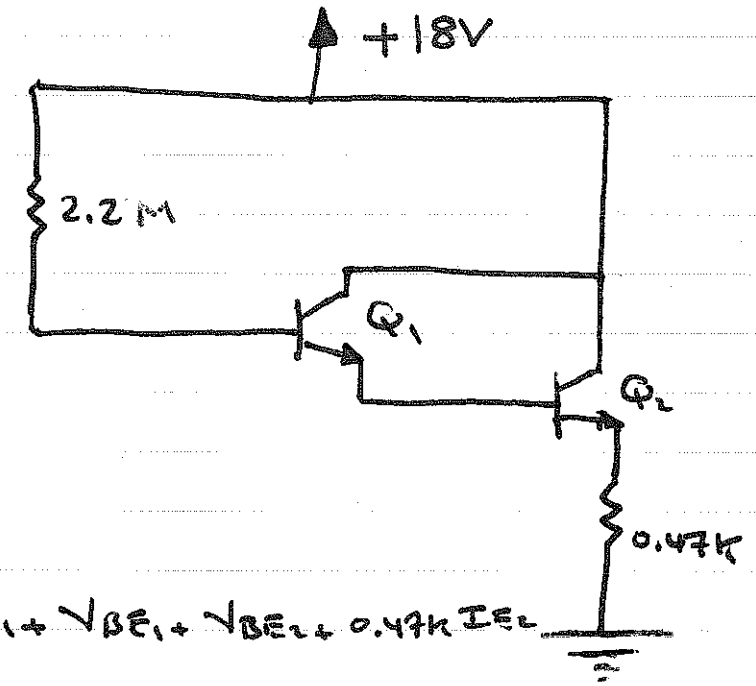
$$\therefore R_1 = 49.87k$$

$$R_2 = 9.88k$$

$$V_{CC} = R_C I_C + V_{CE} + R_E I_E$$

$$\therefore R_C = \frac{24 - 8 - 3}{4mA} = 3.25K$$

46



$\beta_1 = 50$

$\beta_2 = 75$

$18 = 2.2M\, I_{B1} + V_{BE1} + V_{BE2} + 0.47K\, I_{E2}$

$I_{E2} = (\beta_2 + 1)\, I_{B2}$

$I_{B2} = I_{E1}$

$I_{E1} = (\beta_1 + 1)\, I_{B1}$

$I_{E2} = (\beta_2 + 1)(\beta_1 + 1)\, I_{B1}$

$$\therefore I_{B1} = \frac{18 - 1.4}{2.2M + 0.47K(51)(76)}$$

$I_{B1} = 4.128\ \mu A$

$I_{C1} = \beta_1 I_{B1} = 206.38\ \mu A$

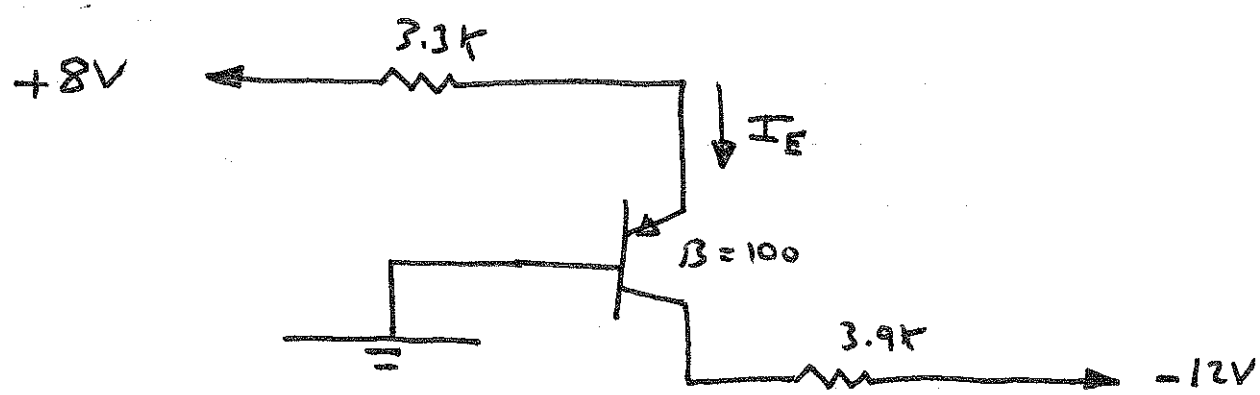
$I_{C2} = 15.788\ mA$

$V_{C1} = V_{C2} = 18V$

$V_{E1} = V_{BE2} + (0.47K)(I_{E2}) = 8.22V$

$V_{E2} = (0.47K)(I_{E2}) = 7.52V$

56



$$8 = 3.3k\, I_E + V_{EB}$$

$$\therefore I_E = 2.712\,mA \quad ; \quad I_C = 2.19\,mA$$

$$V_C = (3.9k)(I_C) - 12$$

$$V_C = 3.458\,V$$