פתרון שאלות הבגרות

באלקטרוניקה תקבילית

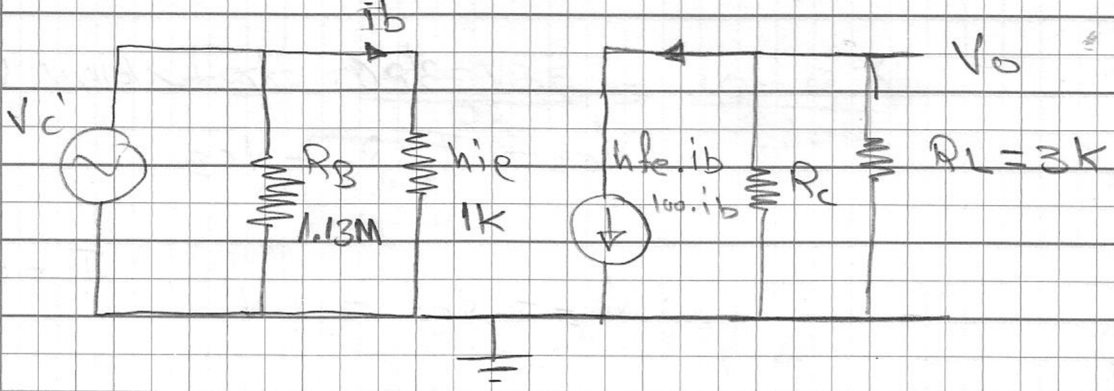
לפי נושאים

משנת 2012 עד 2000

הכנת המורה
ותד עבד אלטיף

פתרון שאלות
טרנזיסטורים

בגרות 2012 שאלה 4 [illegible]



(א)

$$A_V = \frac{V_o}{V_i} = -200 = \frac{-h_{fe} \cdot \cancel{i_b} \cdot R_C \| R_L}{\cancel{i_b} \cdot h_{ie}}$$

$$-200 = \frac{-100 \cdot R_C \| R_L}{1k}$$

$$\frac{-200k}{-100} = R_C \| R_L$$

$$2000 = \frac{R_C \cdot 3k}{R_C + 3k}$$

$$2\cancel{k} R_C + 6000\cancel{k} = R_C 3\cancel{k}$$

$$6000 = R_C = \boxed{6k\Omega}$$

(ב)

$$I_B = \frac{12 - V_{BE}}{R_B} = \frac{12 - 0.7}{1.13M} = \boxed{10\mu A}$$

$$I_C = \beta \times I_B = 100 \times 10\mu A = \boxed{1mA}$$

$$V_{CC} = I_C \cdot R_C + V_{CE}$$

$$12 = 1mA \times 6K + V_{CE}$$

$$12 = 6 + V_{CE}$$

$$V_{CE} = \boxed{6\ V}$$

[illegible]

המשך שאלה 4 מגמות 2012

ג) משוואת קו העבודה

$$V_{CC} = I_C \cdot R_C + V_{CE}$$

$I_C = 0$

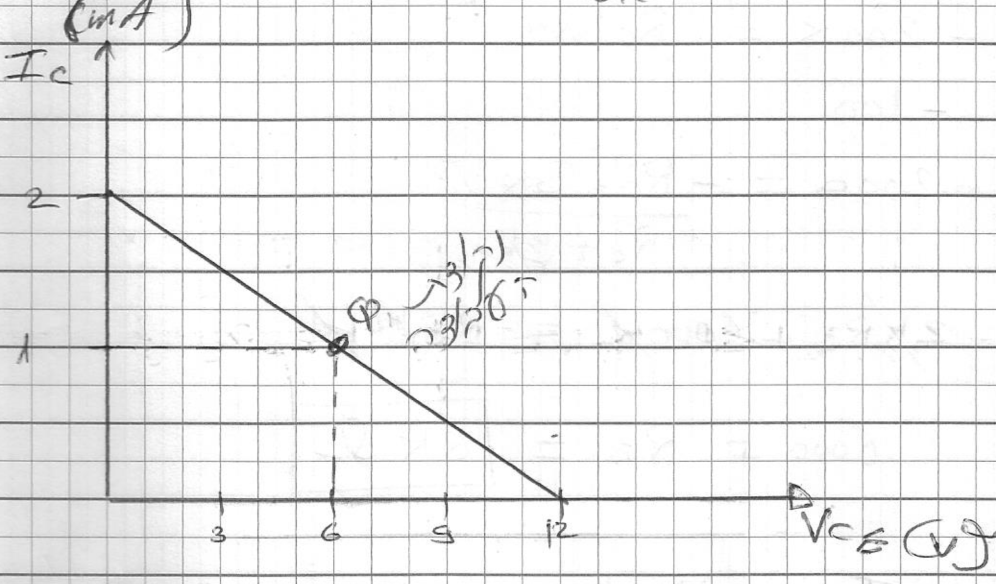
$$V_{CE} = V_{CC} = 12\,V$$

$V_{CE} = 0$

$$V_{CC} = I_C \cdot R_C$$

$$12 = I_C \cdot 6K$$

$$I_C = \frac{12}{6K} = 2\,mA$$



בכבוד רב - [illegible]

בגרות 2011 קיץ שאלה 4

(א)

$$I_B = \frac{V_{CC} - V_{BE}}{R_B} = \frac{10 - 0.7}{930K}$$

$$= \boxed{10\mu A}$$

(ב)

$$V_{CC} = I_C \cdot R_C + V_{CE}$$

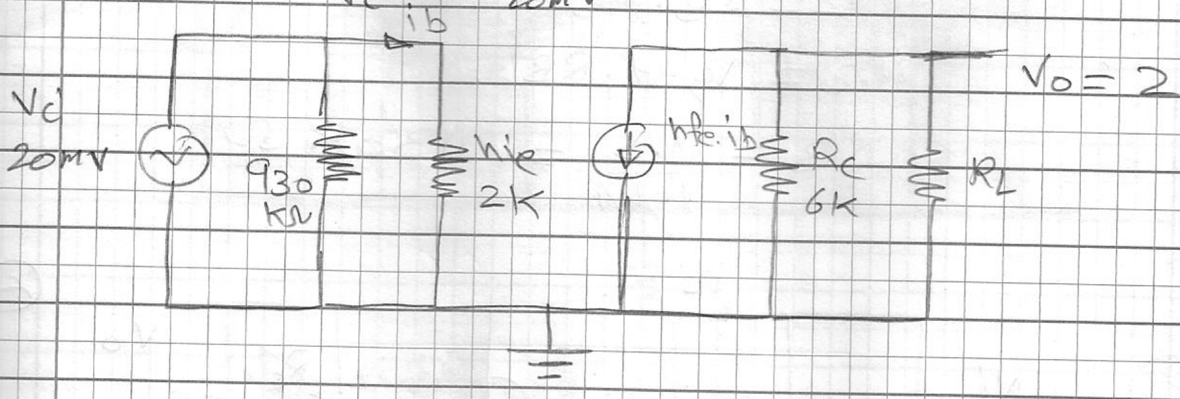
$$10 = \beta \cdot I_B \cdot R_C + 4$$

$$6 = 100 \cdot 10\mu A \cdot R_C$$

$$R_C = \frac{6}{1mA} = \boxed{6K\Omega}$$

(ג)

$$\frac{V_o}{V_i} = \frac{2V}{20mV} = -100$$



$$\frac{V_o}{V_i} = -100 = \frac{-h_{fe} \cdot \cancel{I_b} \cdot R_C \| R_L}{\cancel{i_b} \cdot h_{ie}}$$

$$h_{ie} \cdot \cancel{100} = -\cancel{100} \cdot R_C \| R_L$$

$$2000 = \frac{R_C \cdot R_L}{R_C + R_C} = \frac{6K \cdot R_L}{6K + R_L}$$

$$6000\cancel{K} + 2\cancel{K} R_L = 6\cancel{K} \cdot R_L$$

$$12000 = 4R_L$$

$$R_L = \boxed{3K\Omega}$$

בהצלחה [illegible]

בגרות 2010 שאלה מס' 4

(א)

$V_{CC} = I_C \cdot R_C + V_{CE}$

$12 = I_C \cdot R_C + V_{CE}$

מאפיין

$I_C = 4mA \quad V_{CE} = 0$

$12 = 4mA \cdot R_C$

$R_C = \frac{12}{4mA} = \boxed{3K\Omega}$

(ב) מאפיין

$V_{CE} = 9V$

$I_C = 1mA$

$I_B = 10\mu A$

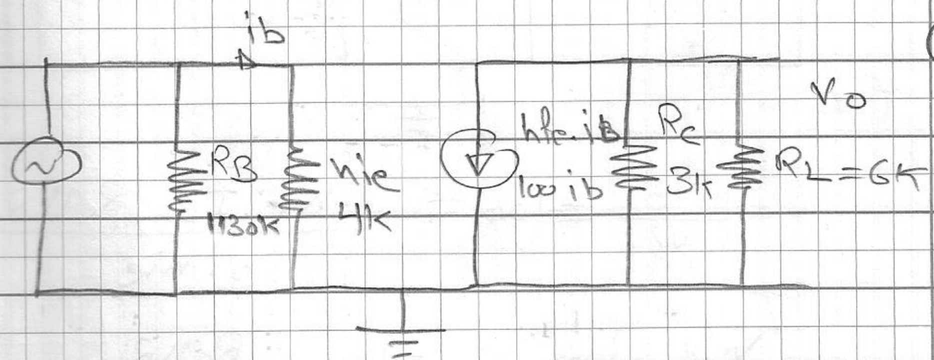
$12 = V_{RB} + V_{BE}$

$12 = I_B \cdot R_B + 0.7$

$11.3 = 10\mu A \cdot R_B$

$R_B = \frac{11.3}{10\mu A} = 1130K\Omega$

(ג)



(ד)

$A_V = \frac{-h_{fe} \cdot \cancel{i_b} \cdot R_C \| R_L}{\cancel{i_b} \cdot h_{ie}}$

$= \frac{-100 \cdot \frac{3K \cdot 6K}{9K}}{4K} = \frac{-100 \cdot 2K}{4K} = \boxed{-50}$

המגבר הוא - מגבר פולט משותף.

מבגרות 2009 שאלה מס' 1

(א)

$$V_{CC} = I_B \cdot R_B + V_{BE}$$

$$10 = I_B \cdot 930k + 0{,}7V$$

$$\frac{9.3V}{930k} = I_B = \boxed{10\,\mu A}$$

(ב)

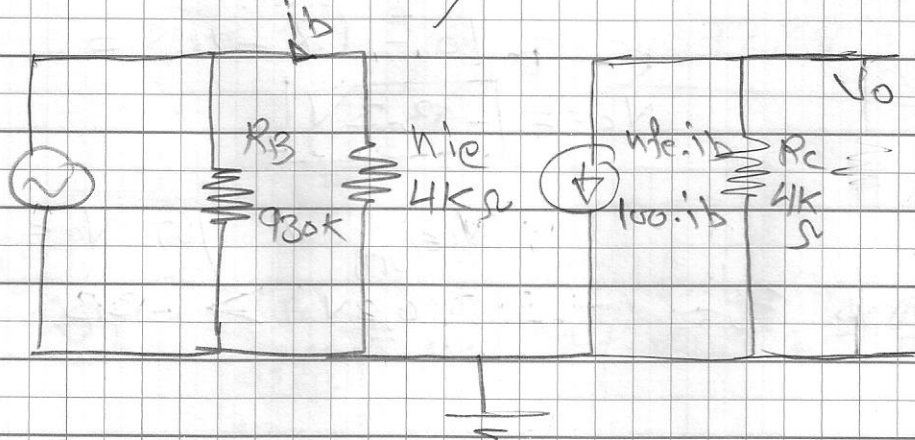
$$V_{CC} = I_C \cdot R_C + V_{CE}$$

$$10 = \beta \cdot I_B \cdot R_C + 6V$$

$$4 = 100 \cdot 10\mu A \cdot R_C$$

$$R_C = \frac{4}{1000\mu A} = \boxed{4k\Omega}$$

(ג)



(ד)

$$\frac{V_o = -h_{fe} \cdot i_b \cdot R_C}{h_{ie} \cdot i_b}$$

$$= \frac{-100 \cdot 4k}{4k} = \boxed{-100}$$

בהצלחה גם - [illegible]

בגרות 2008 קיץ שאלה 3

(א)

$V_i = I_B \cdot R_B + V_{BE}$

$5 = I_B \cdot 20K + 0.7$

$I_B = \frac{4.3}{20K} = \boxed{215\mu A}$

(ב)

$V_{CC} = V_{LED} + V_{RC} + V_{CE}$

$10 = 1.8 + 100 \cdot 215\mu \cdot 1K + V_{CE}$

$10 = 1.8 + 21.5 + V_{CE}$

$V_{CE} = 10 - 1.8 - 21.5 =$

$V_{CE} = \boxed{-13.3V}$

V_{CE} שלו $-13.3 < 0.2V \sim V_{CE(sat)}$ לכן לא תקין

בהצלחה רבה - יוסף אבו סאלח.

מבחן 2007 יולי מס' 2

(א)

$$V_{CC} = I_C \cdot R_C + V_{CE}$$

$$10 = I_C \cdot 2K + 5V$$

$$I_C = \frac{5}{2K} = \boxed{2.5mA}$$

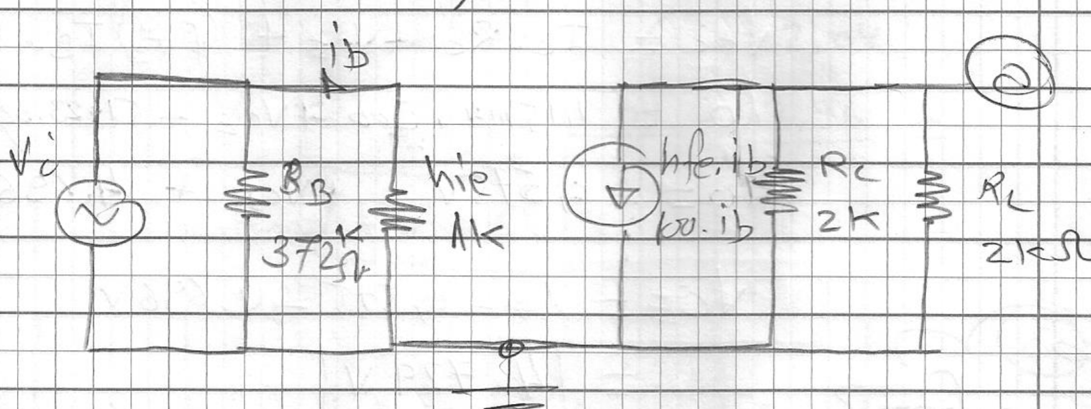
$$V_{CC} = R_B \cdot I_B + V_{BE}$$

$$10 = R_B \cdot \frac{I_C}{\beta} + 0.7$$

$$9.3 = R_B \cdot \frac{2.5mA}{100}$$

$$R_B = \frac{9.3}{25\mu A} = \boxed{372K\Omega}$$

(ב)



(ג)

$$\frac{V_o}{V_i} = \frac{-hfe \cdot \cancel{ib} \cdot R_C \| R_L}{\cancel{ib} \cdot hie}$$

$$= \frac{-100 \cdot \frac{2k \cdot 2k}{4k}}{1k}$$

$$= \frac{-100 \cdot 1k}{1k} = \boxed{-100}$$

בהצלחה רמי - שגיא שחר אלי ג.

בגרות 2008 קיץ: מס' 4

(א)

$$V_{CC} = I_B \cdot R_B + V_{BE} + V_{RE}$$

$$10 = I_B \cdot 200k + 0.7 + (\beta+1) I_B \cdot 4k\Omega$$

$$9.3 = 200000 I_B + 51 \times 4k I_B$$

$$9.3 = 200000 I_B + 204000 I_B$$

$$I_B = \frac{9.3}{404000} = \boxed{23.02 \mu A}$$

$$I_C = \beta \cdot I_B$$

$$I_C = \boxed{1.15 mA}$$

$$V_{CC} = I_C \cdot R_C + V_{CE} + (\beta+1) I_B \cdot R_E$$

$$10 = 1.15mA \cdot 500 + V_{CE} + 51 \times 23.02 \mu A \cdot 4k$$

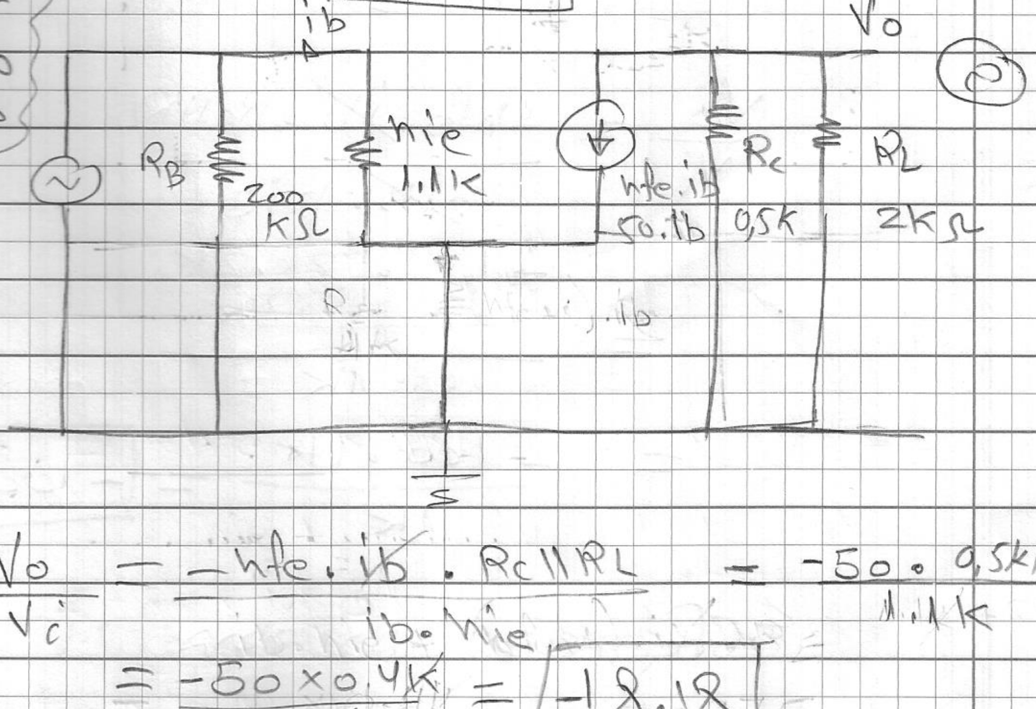
$$10 = 0.575V + V_{CE} + 4.696V$$

$$V_{CE} = 10 - 0.575 - 4.696V$$

$$= \boxed{4.729 V}$$

היברידי
מודל
פרמטרי היבריד

(ב)



$$\frac{V_o}{V_i} = \frac{-h_{fe} \cdot i_b \cdot R_C \| R_L}{i_b \cdot h_{ie}} = \frac{-50 \cdot 0.5k \| 2k}{1.1k}$$

$$= \frac{-50 \times 0.4k}{1.1k} = \boxed{-18.18}$$

פתרון 2005 קיץ שאלה 3

(א)

$$I_B = \frac{I_C}{\beta} = \frac{2mA}{50} = 40\mu A$$

$$V_{CC} = I_B \times R_B + 0.7 + (\beta+1) I_B \cdot R_E$$

$$12 = 40\mu A \cdot R_B + 0.7 + 51 \times 40\mu A \cdot 1K$$

$$12 = 40\mu A \cdot R_B + 0.7 + 2.04$$

$$\frac{12 - 0.7 - 2.04}{40\mu A} = R_B = \frac{9.26}{40\mu A}$$

$$\longrightarrow R_B = \boxed{231.5 k\Omega}$$

$$V_{CC} = I_C \cdot R_C + V_{CE} + (\beta+1) I_B \cdot R_E$$

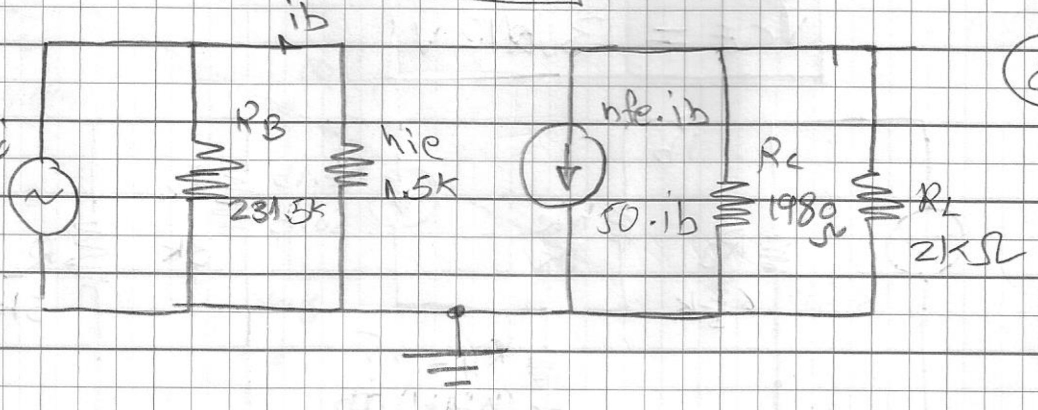
$$12 = 2mA \cdot R_C + 6 + 51 \times 40\mu A \cdot 1K$$

$$12 = 2mA \cdot R_C + 6 + 2.04$$

$$R_C = \frac{12 - 6 - 2.04}{2mA} = \frac{3.96}{2mA} =$$

$$R_C = \boxed{1980\,\Omega}$$

(ב)



(ג)

$$A_V = \frac{V_o}{V_i} = \frac{-h_{fe} \cdot i_b \cdot R_C \parallel R_L}{i_b \cdot h_{ie}}$$

$$= \frac{-50 \cdot \frac{1980 \cdot 2000}{1980 + 2000}}{1.5 k\Omega} = \boxed{-33.16}$$

בהצלחה רק - טוב לכם ג.מ.

4 أكتوبر 2004 ساعتان

$$V_B = 12 \cdot \frac{R_2}{R_2+R_1} = \frac{12 \cdot 10k}{10+20k} = 4V$$ (k)

$$R_B = R_1 \| R_2 = \frac{10k \times 20k}{10k+20k} = 6\frac{2}{3} k\Omega$$

$$V_B = V_{R_B} + V_{BE} + V_{R_4} + V_{R_5}$$

$$4 = I_B \cdot R_B + 0{,}7 + (\beta+1) \cdot I_B (R_4+R_5)$$

$$4-0{,}7 = 6\frac{2}{3}k\, I_B + 51\, I_B (0{,}5k+1k)$$

$$3.3V = 6\frac{2}{3}k\, I_B + 76.5k\, I_B$$

$$3.3V = 83.166k\, I_B$$

$$I_B = \frac{3.3}{83.166k} = \boxed{39.68\,\mu A}$$

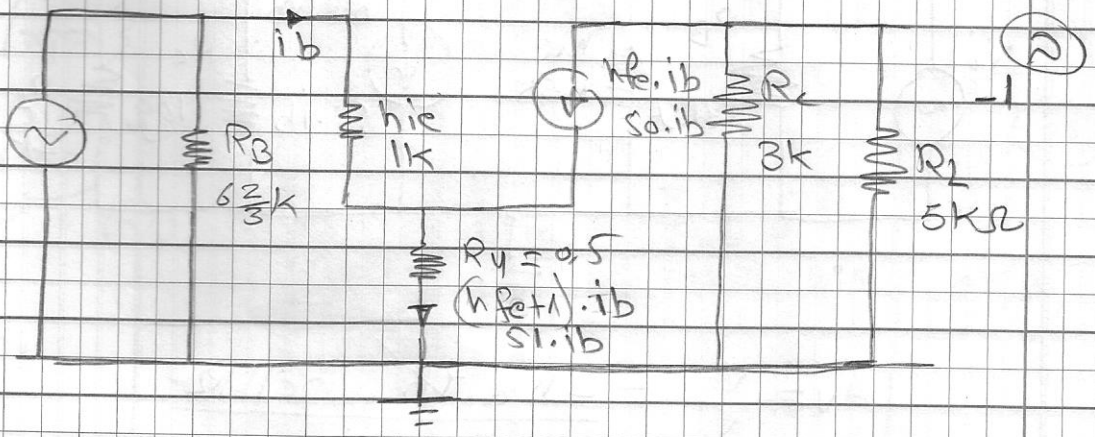
$$I_c = \beta I_B = 50 \times 39.68\mu A = \boxed{1.984\,mA}$$

$$V_{cc} = I_c \cdot R_3 + V_{CE} + (\beta+1) \cdot I_B (R_4+R_5)$$

$$12 = 1.984mA \times 3k + V_{CE} + 51 \times 39.68\mu A \cdot 1.5k$$

$$12 = 5.952 + V_{CE} + 3.035$$

$$\boxed{V_{CE} = 3.012\,V}$$



$$\frac{V_o}{V_i} = \frac{-hfe \times Rc \| RL}{hie + (hfe+1) R_4} = \frac{-50 \times \frac{3k \times 5k}{8k}}{1k + 25.5k} = -2$$

$$= \frac{-50 \times 1.875K}{26.5k} = \boxed{-3.524}$$

$$\boxed{5.326\,k\Omega} \Leftarrow Ri = R_B \| (hie + R_4 \cdot 51) = \frac{6\frac{2}{3}k \cdot 26.5k}{33.166k}$$ (6)

פתרון 2000 שאלה מס' 3

(א)

$V_B = V_{CC} \times \frac{R_2}{R_2+R_1} = 15 \times \frac{10k}{25k} = 6V$

$R_B = R_1 \| R_2 = \frac{15k \times 10k}{25k} = 6k\Omega$

$V_B = I_B \cdot R_B + V_{BE} + (\beta+1) I_B \cdot R_E$

$6 = I_B \cdot 6k + 0.7 + 51 \cdot 1k \cdot I_B$

$5.3 = 56k\, I_B$

$I_B = \frac{5.3}{57k} = \boxed{92.98\mu A}$

$I_C = 50 \cdot I_B = \boxed{4.649mA}$

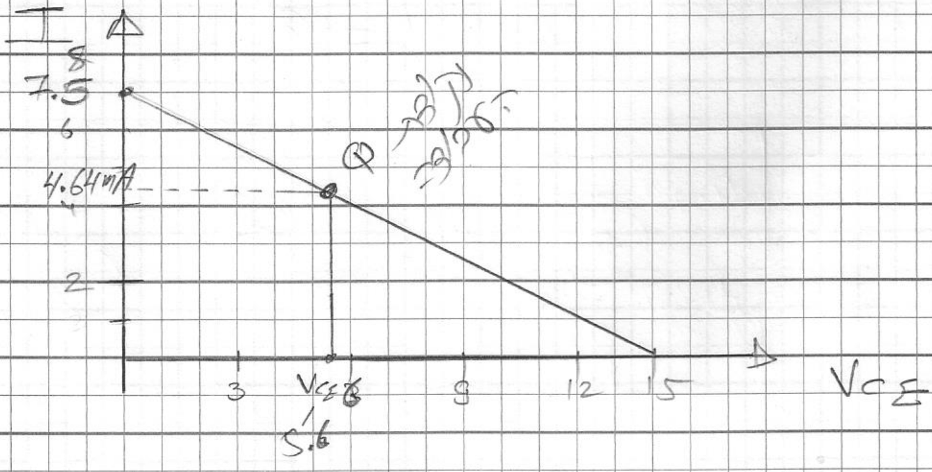
$V_{CC} = I_C \cdot R_C + V_{CE} + (\beta+1) \cdot I_B \cdot R_E$

$15 = 4.649mA \cdot 1k + V_{CE} + 51 \times 92.98\mu A \cdot 1k$

$15 = 4.649V + V_{CE} + 4.741V$

$V_{CE} = 15 - 4.649 - 4.741 = \boxed{5.609V}$

(ב)



$V_{CC} = I_C (R_C + R_E) + V_{CE}$ $\quad V_{CE} = 0$

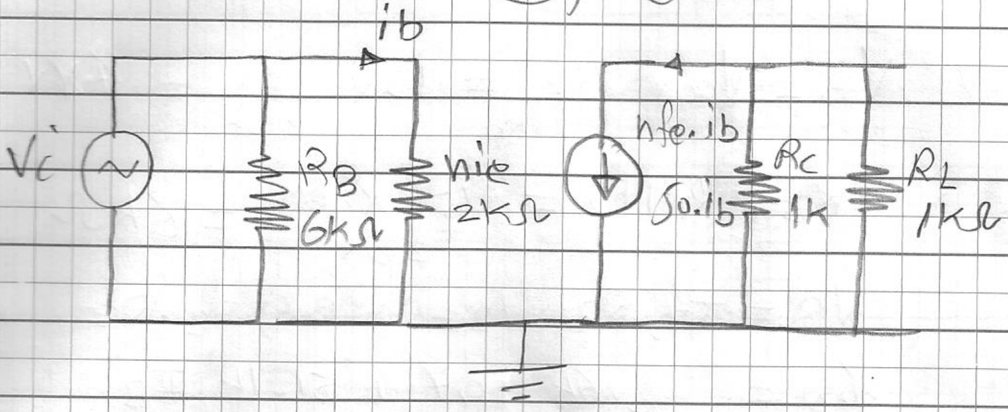
$I_C = \frac{15}{2k} = 7.5mA$

$I_C = 0$

$V_{CE} = V_{CC} = 15V$

[illegible]

המשך שאלה מס' 3 בבחינת 2000



$$\frac{V_o}{V_i} = -\frac{h_{fe} \cdot R_C \| R_L}{h_{ie}} = \frac{-50 \times \frac{1K \times 1K}{2K}}{2K}$$

$$= -\frac{50 \times 0.5K}{2K} = \boxed{-12.5}$$

בברכה רב - ונתן אבא