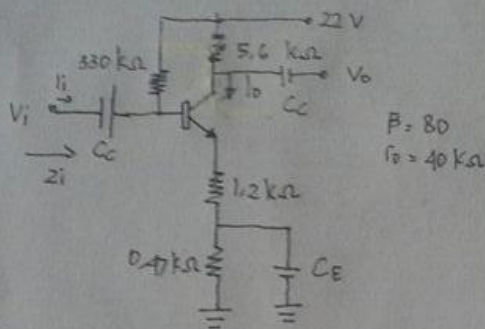


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 NIM : D400150105
 Kelas : C

TUGAS ELEKTRONIKA ANALOG DASAR

10/



diketahui = $R_B = 330 \text{ k}\Omega$
 $R_C = 5.6 \text{ k}\Omega$
 $V_{CC} = 22 \text{ V}$
 $R_E = 1.2 + 0.47$
 $= 1.67 \text{ k}\Omega$
 $\beta = 80$
 $r_o = 40 \text{ k}\Omega$

ditanya = a. r_e
 b. Z_i dan A_v
 c. A_i

Jawab =

$$\begin{aligned} \text{a. } I_B &= \frac{V_{CC} - V_{BE}}{R_B} \\ &= \frac{22 - 0.7}{330 \text{ k}\Omega} \\ &= \frac{21.3}{330} = 64.54 \text{ }\mu\text{A} \end{aligned}$$

$$\begin{aligned} I_E &= \beta \cdot I_B \\ &= 80 \cdot 64.54 = 5163.2 \text{ }\mu\text{A} = 5.16 \text{ mA} \end{aligned}$$

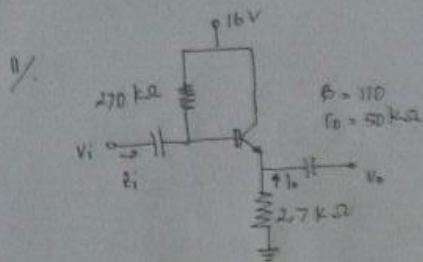
$$\begin{aligned} r_e &= \frac{20 \text{ mV}}{I_E} \\ &= \frac{20 \text{ mV}}{5.16 \text{ mA}} = 3.87 \text{ }\Omega \end{aligned}$$

$$\begin{aligned} \text{b. } r_o &\gg 10 (R_C + R_E) \\ 40 \text{ k}\Omega &\gg 10 (5.6 \text{ k}\Omega + 1.67 \text{ k}\Omega) \\ 40 \text{ k}\Omega &\gg 72.7 \text{ k}\Omega \\ Z_i &= \beta r_e \\ &= 80 \cdot 3.87 = 309.6 \text{ }\Omega \end{aligned}$$

$$\begin{aligned} r_o &\gg 10 R_C \\ 40 \text{ k}\Omega &\gg 10 \cdot 5.6 \text{ k}\Omega \\ 40 \text{ k}\Omega &\gg 56 \text{ k}\Omega \\ A_v &= - \frac{R_C}{R_E} \\ &= - \frac{5.6 \text{ k}\Omega}{1.67 \text{ k}\Omega} = -3.3 \end{aligned}$$

$$\begin{aligned} \text{c. } A_i &= - A_v \frac{Z_i}{R_C} \\ &= 3.3 \cdot \frac{309.6}{5.6 \times 10^3} \\ &= \frac{1021.68 \times 10^{-3}}{5.6} \\ &= 182.4 \times 10^{-3} \end{aligned}$$

Nama : Sri Indah Riza Ningsih



diketahui : $R_B = 270 \text{ k}\Omega$ $r_E = 50 \text{ k}\Omega$
 $R_E = 2.7 \text{ k}\Omega$
 $V_{CC} = 16 \text{ V}$
 $\beta = 110$

ditanya : a. r_e , B_{re}
 b. Z_i dan Z_o
 c. A_v dan A_i

Jawab :

$$a. I_B = \frac{V_{CC} - V_{be}}{R_B + (\beta + 1)R_E} = \frac{16 - 0.7}{270 + (110 + 1) \cdot 2.7 \text{ k}\Omega} = \frac{15.3}{569.7} = 26.85 \text{ }\mu\text{A}$$

$$I_E = (\beta + 1) \cdot I_B$$

$$= 111 \cdot 26.85 = 2.980 \text{ mA}$$

$$r_e = \frac{26 \text{ mV}}{I_E} = \frac{26 \text{ mV}}{2.98 \text{ mA}} = 8.72 \text{ }\Omega = 0.00872 \text{ k}\Omega$$

$$B_{re} = 110 \cdot 8.72 = 959.2 \text{ }\Omega = 0.959 \text{ k}\Omega$$

$$b. Z_b = B_{re} + (\beta + 1)R_E = 0.959 + (110 + 1) \cdot 2.7 \text{ k}\Omega = 300.659 \text{ k}\Omega$$

$$Z_i = R_B \parallel Z_b$$

$$= 270 \parallel 300 = \frac{81000}{570} = 142 \text{ k}\Omega$$

$$Z_o = R_E \parallel r_e$$

$$= 2.7 \text{ k}\Omega \parallel 0.00872 = \frac{0.023544}{2.70872} = 0.0086 \text{ k}\Omega$$

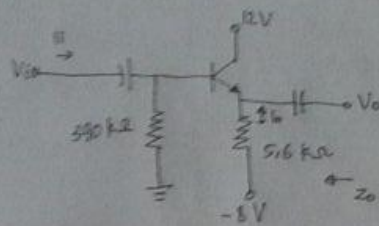
$$c. A_v = \frac{V_o}{V_i} = \frac{R_E}{R_E + r_e} = \frac{2.7 \text{ k}\Omega}{2.7 \text{ k}\Omega + 0.00872 \text{ k}\Omega} = \frac{2.7 \text{ k}\Omega}{2.70872 \text{ k}\Omega} = 0.99$$

$$A_i = - \frac{\beta R_B}{R_B + Z_b}$$

$$= - \frac{110 \cdot 270 \text{ k}\Omega}{270 \text{ k}\Omega + 300 \text{ k}\Omega} = - \frac{29700 \text{ k}\Omega}{570 \text{ k}\Omega} = 52.10$$

Nama: Sri Indah Purnama

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$\beta = 120$
 $r_o = 40 \text{ k}\Omega$

diketahui = $R_C = 390 \text{ k}\Omega$

$R_E = 5.6 \text{ k}\Omega$

$V_i = 12 \text{ V}$

$\beta = 120$

$r_o = 40 \text{ k}\Omega$

ditanya = a. Z_i dan Z_o

b. A_v

c. V_o jika $V_i = 1 \text{ mV}$

Jawab =

$$\begin{aligned} a. \quad Z_i &= R_E \parallel r_e \\ &= 5.6 \parallel 16.7 \\ &= \frac{5.6 \times 16.7}{5.6 + 16.7} \\ &= 0.0166 \text{ k}\Omega \end{aligned}$$

$$Z_o = R_C = 390 \text{ k}\Omega$$

$$Z_o = 390 \text{ k}\Omega$$

$$\begin{aligned} b. \quad A_v &= - \left(\frac{R_C \parallel r_o}{r_e} \right) \\ &= - \left(\frac{390 \parallel 40}{0.0167} \right) \\ &= - \frac{36.27}{0.0167} \\ &= -2172.3 \end{aligned}$$

$$c. \quad A_v = \frac{V_o}{V_i}$$

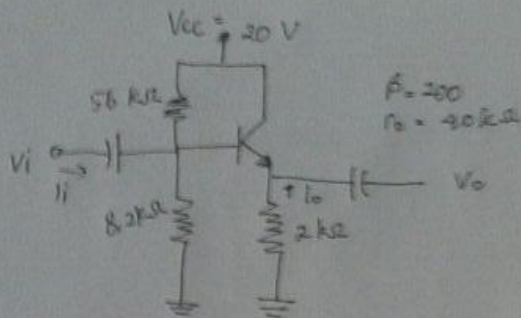
$$-2172.3 = \frac{V_o}{1 \text{ mV}}$$

$$V_o = -2172.3 \text{ mV}$$

$$\begin{aligned} I_E &= \frac{V_{EE} - V_{BE}}{R_E} \\ &= \frac{-8 - 0.7}{5.6 \text{ k}\Omega} \\ &= 1.55 \text{ mA} \end{aligned}$$

$$\begin{aligned} r_e &= \frac{26 \text{ mV}}{I_E} \\ &= \frac{26}{1.55} \\ &= 16.7 \Omega \end{aligned}$$

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diketahui : $R_B = 8,2 \text{ k}\Omega + 56 \text{ k}\Omega = 64,2 \text{ k}\Omega$

$R_C = 2 \text{ k}\Omega$

$\beta = 200$

$r_o = 40 \text{ k}\Omega$

$V_{CC} = 20 \text{ V}$

ditanya : a. I_B dan I_C

b. r_e

c. Z_i dan Z_o

d. A_v dan A_i

jawab :

a. $I_B = \frac{V_{CC} - V_{BE}}{R_B} = \frac{20 - 0,7}{64,2 \text{ k}\Omega} = 300,6 \text{ }\mu\text{A}$

$I_C = \frac{V_{CC} - V_{BE}}{R_C} = 9,65 = 9650 \text{ }\mu\text{A}$

b. $r_e = \frac{26 \text{ mV}}{I_E}$

$I_E = \frac{26 \text{ mV}}{60,42 \text{ mA}}$
 $= 0,43 \text{ }\Omega$

$I_E = \frac{(1 + \beta) I_B}{(200 + 1) \cdot 300,6 \text{ }\mu\text{A}}$
 $= 201 \cdot 300,6 \text{ }\mu\text{A}$
 $= 60420,6 \text{ }\mu\text{A} = 60,42 \text{ mA}$

c. $r_{re} = 200 \cdot 0,43 = 86 \text{ }\Omega = 0,086 \text{ k}\Omega$

$Z_i = R_B \parallel R_{re}$

$= 64,2 \parallel 0,086$

$= \frac{5,5212}{64,286} = 0,085 \text{ k}\Omega$

$Z_o = R_C \parallel r_{re} = 2 \parallel 0,43 = 353,90 \text{ }\Omega$

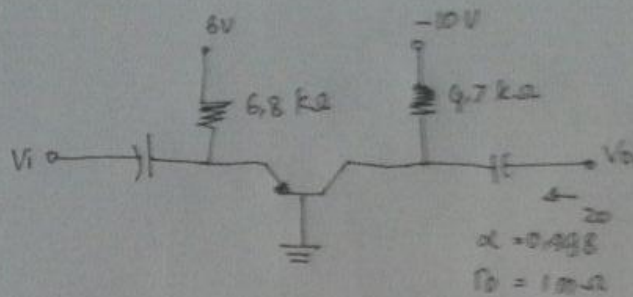
d. $A_v = - \frac{R_C}{r_e}$

$= - \frac{2 \text{ k}\Omega}{0,43 \text{ }\Omega} = -4651$

$A_i = - A_v \frac{Z_i}{R_C}$

$= +4651 \cdot \frac{0,085 \text{ k}\Omega}{2 \text{ k}\Omega} = 197,66$

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diketahui = $R_E = 6,8 \text{ k}\Omega$
 $R_C = 4,7 \text{ k}\Omega$
 $V_{EE} = 6 \text{ V}$
 $V_C = -10 \text{ V}$

ditanya = a. r_e
 b. Z_i dan Z_o
 c. A_v dan A_i

jawab =

$$a. I_E = \frac{V_{EE} - V_{BE}}{R_E} = \frac{6 \text{ V} - 0,7 \text{ V}}{6,8 \text{ k}\Omega} = \frac{5,3}{6,8} = 779,41 \text{ }\mu\text{A}$$

$$r_e = \frac{26 \text{ mV}}{I_E} = \frac{26}{779,41} = 0,0333 \text{ }\Omega$$

$$\begin{aligned}
 b. Z_i &= R_E \parallel r_e \\
 &= 6,8 \parallel 0,0333 \\
 &= \frac{224,4}{6800,03} = 0,033 \text{ }\Omega
 \end{aligned}$$

$$Z_o = R_C = 4,7 \text{ k}\Omega$$

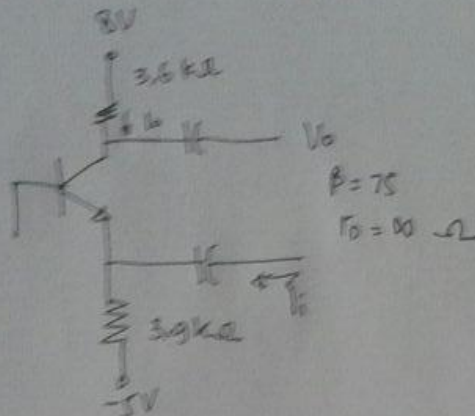
$$c. A_v \cong \frac{R_C}{r_e} = \frac{4,7}{0,033} = 142424$$

$$A_i = -0,998$$

$$= 1$$

Nama: Sri Indah Pujaningih

15/.



diketahui = $R_C = 3.6 \text{ k}\Omega$
 $R_E = 3.9 \text{ k}\Omega$
 $V_{CC} = 8 \text{ V}$
 $V_{EE} = -5 \text{ V}$

ditanya = a. A_v
 b. A_i

jawab =

$$\begin{aligned} \text{a. } A_v &= \frac{R_C}{r_e} \\ &= \frac{3.6 \text{ k}\Omega}{-17.80 \Omega} \\ &= -202.2 \end{aligned}$$

$$\begin{aligned} I_E &= \frac{V_{EE} - V_{BE}}{R_E} \\ &= \frac{-5 - 0.7}{3.9 \text{ k}\Omega} \\ &= \frac{-5.7}{3.9} = -1.46 \text{ mA} \end{aligned}$$

$$\begin{aligned} r_e &= \frac{26 \text{ mV}}{I_E} \\ &= \frac{26 \text{ mV}}{-1.46} \\ &= -17.80 \Omega \end{aligned}$$

$$\text{b. } A_i = -1$$