BJT ac Analysis _part2 (Floyd)

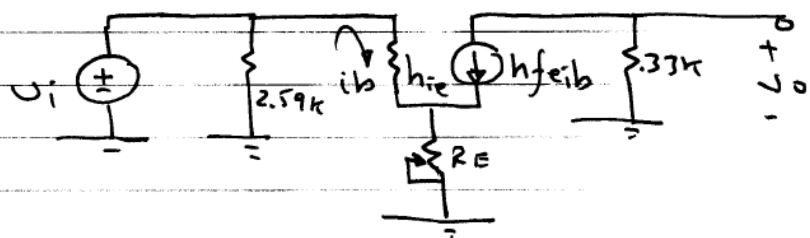
6.14 $\quad V_{TH} = \frac{3.3K}{3.3K + 12K} \cdot 8 = 1.725V$

$R_{TH} = 3.3K \| 12K = 2.59K$

$I_E = \frac{1.725 - 0.7}{0.1K + \frac{2.59K}{151}} = 8.749\ mA$

$h_{ie} = \frac{\beta V_T}{I_E} = 64.5\ \Omega$

ac small Signal Equivalent ckt



$v_o = -(0.33k) h_{fe} i_b$

$i_b = \frac{v_i}{h_{ie} + (h_{fe} + 1) R_E}$

$$A_v = \begin{cases} -112.5 & \text{for } R_E = 0 \\ -2.17 & \text{for } R_E = 100\Omega \end{cases}$$

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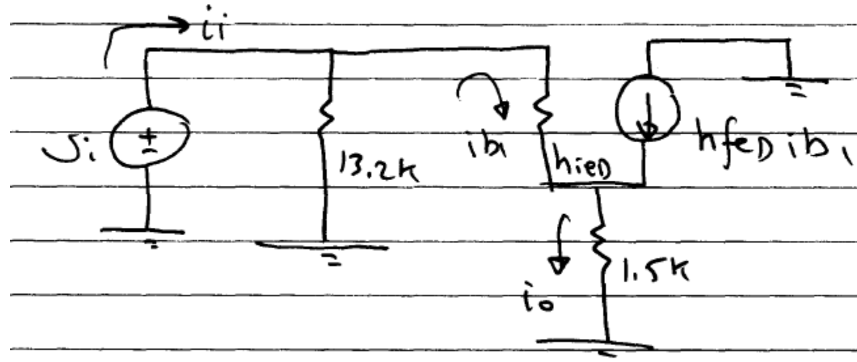
$h_{ie1} = 227.7\,K$

$h_{ieD} = 2h_{ie1} = 455.4\,K$

$h_{feD} = h_{fe1} h_{fe2} = 15000$

ac small Signal Equivalent ckt



$$i_o = (1+h_{feD})\, i_b$$

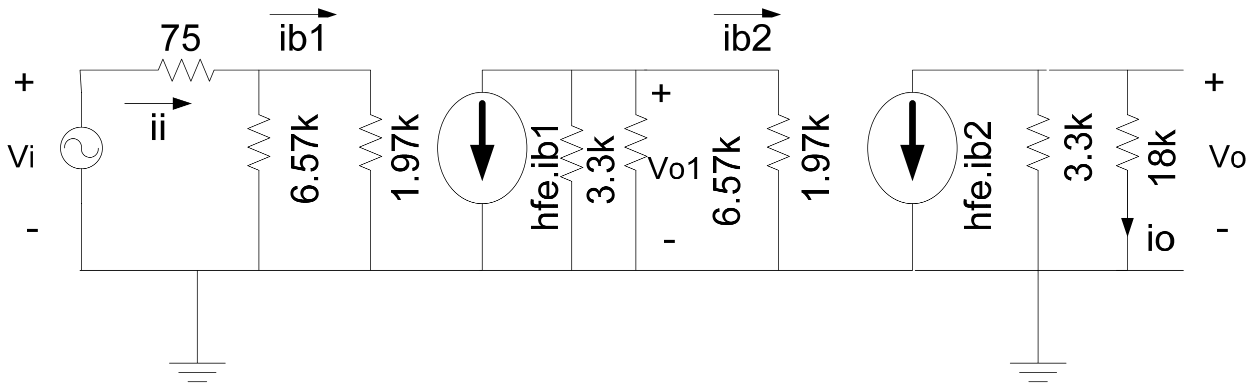
$$i_{b1} = \frac{13.2k \quad i_i}{13.2k + h_{ieD} + 1.5k(1+h_{feD})}$$

$$A_i = \frac{i_o}{i_i} = 8.62$$

6.30

From dc analysis : hie1=hie2= VT/ IBQ = 1.97 k

Ac analysis:
Small signal equivalent circuit:



Av2= Vo/ Vo1

Av2=Vo1/Vi

Vo= -hfe.ib2. (3.3k//18k)

ib2= [-hfe.ib1. (3.3k//6.57k)]/[(3.3k//6.57k)+1.97k]

Vo1=-hfe.ib1.(3.3k//5.67k//1.97k)

ib1=ii .6.57k/(6.57k+1.97k)

ii=Vi/[(6.57k//1.97k)+0.075k]

Av2= (Vo/ib2).(ib2/ib1).(ib1/Vo1)
= -247.73

Av1= Vo1/Vi= (Vo1/ib1).(ib1/ii).(ii/Vi)
= -88.2
Av=Av1.Av2=21853.4