ANALOG CIRCUIT DESIGN

WISSENAIRE

Simulation Report

And Solutions

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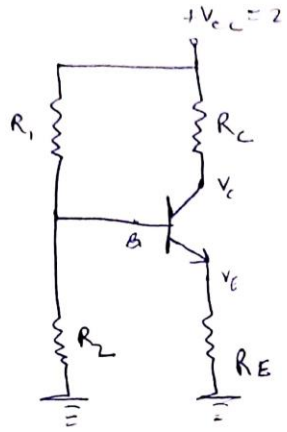
Solution No. 4

a)

DC Analysis



$A_V(DC) = -100$.

$I_C = 4mA$

$V_{CE} = 12V$

$I_{C(sat)} = 8mA$

DC current gain (β) = 100

$R_2 \leq \frac{(\beta R_E)}{10}$.

$V_{BE} = 0.7V$

$V_C = 24 - (8mA) R_C$ $\qquad V_E = -I_C R_E$

$V_{CE} = 12V$

$24 - 8mA\, R_C - 8mA\, R_E = 12$

$12 = 8mA\,(R_C + R_E)$

$\frac{3}{2} k\Omega = R_C + R_E$

$\frac{3}{2} k\Omega = 101 R_E$

$R_E = 0.0297\, k\Omega$

$R_E = 29.67\, \Omega$

$R_E = 29.67\, \Omega$

$R_E = \frac{0.0297}{2} k\Omega \simeq 0.015 k\Omega$

$R_C = \frac{2.97 k\Omega}{2} \simeq 1.5 k\Omega$.

and

$A_V = -100$

$\Rightarrow -100 = -\frac{R_C}{R_E}$

$100 R_E = R_C$

$R_{TH} = 0.1(\beta+1) R_E$ So from R_{TH} we can get R_1, R_2 also

d) In DC operation, the capacitors behaves as open circuit because the w is 0 for DC and the impedance of capacitance is 1/wC.

e) The specification given as $R2 \leq (\beta RE)/10$ is to ensure bias stability.

g) The frequency response of a CE amplifier and explain why does it look like that is because in the CE amplifier it depends on the frequency of the ac source.