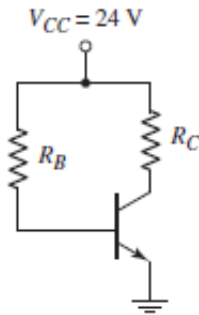


Graded Questions

Problem: 1

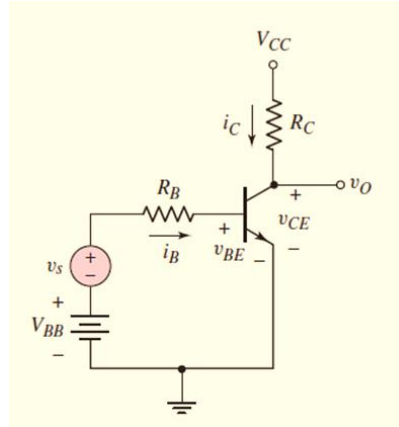
The bias voltage in the circuit in Figure is changed to $V_{CC} = 9\text{ V}$. The transistor current gain is $\beta = 80$.

Design the circuit such that $I_{CQ} = 0.25\text{ mA}$ and $V_{CEQ} = 4.5\text{ V}$. (b) If the transistor is replaced by a new one with $\beta = 120$, find the new values of I_{CQ} and V_{CEQ} . (c) Sketch the load line and Q -point for both parts (a) and (b).



Problem:2

For the circuit in Figure assume transistor parameters of $\beta = 150$, $V_{BE(on)} = 0.7\text{ V}$, and $V_A = 200\text{ V}$. The circuit parameters are $V_{CC} = 7.5\text{ V}$, $V_{BB} = 0.92\text{ V}$, $R_B = 100\text{ k}$, and $R_C = 15\text{ k}$. (a) Determine the small-signal hybrid- π parameters g_m , r_π , and r_o .



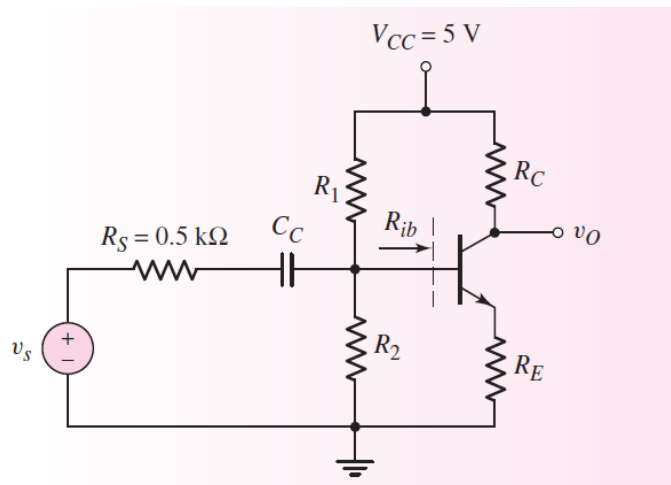
Problem:3

Determine the small-signal voltage gain and input resistance of a common-emitter circuit with an emitter resistor. For the circuit in Figure, the transistor parameters are: $\beta = 120$, $V_{BE(on)} = 0.7\text{ V}$, and $V_A = \infty$.

Resistors are

$$R_E = 0.6\text{ k}\Omega, R_C = 5.6\text{ k}\Omega, R_1 = 250\text{ k}\Omega, R_2 = 75\text{ k}\Omega$$

- (a) Determine the small-signal voltage gain A_v . (b) Determine the input resistance looking into the base of the transistor



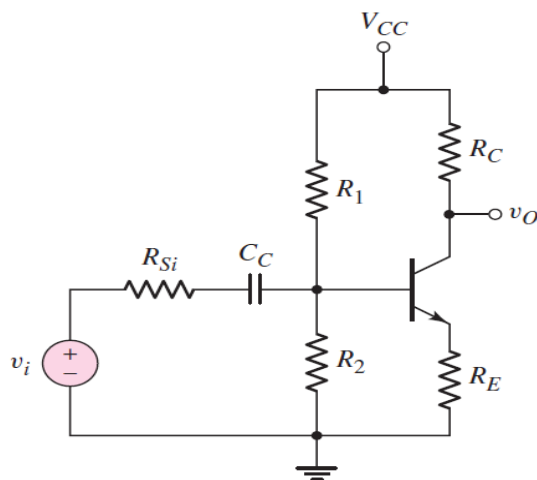
Problem:4

For the circuit shown in Figure, the parameters are: $V_{CC} = 3\text{ V}$, $R_{Si} = 0$, $R_1 = 110\text{ k}\Omega$, $R_2 = 42\text{ k}\Omega$, $R_E = 0.5\text{ k}\Omega$, $R_C = 7\text{ k}\Omega$, and $C_C = 0.47\text{ }\mu\text{F}$. The transistor parameters are $\beta = 150$, $V_{BE(on)} = 0.7\text{ V}$, and $V_A = \infty$.

Draw the hybrid pi model

Determine the expression for and the value of the time constant τ_S . (b)

Determine the corner frequency and midband voltage gain.



Problem: 5

For the circuit in Figure the parameters are $R_1 = 200\text{ k}\Omega$, $R_2 = 220\text{ k}\Omega$, $R_C = 2.2\text{ k}\Omega$, $R_L = 4.7\text{ k}\Omega$, $R_E = 1\text{ k}\Omega$, $r_s = 100\text{ k}\Omega$, and $V_{CC} = 5\text{ V}$. The transistor parameters are $\beta_o = 100$, $V_{BE(on)} = 0.7\text{ V}$, $V_A = \infty$, $C_\mu = 2\text{ pF}$ and $C_\pi = 10\text{ pF}$.

(a) Consider the simplified hybrid- π model of the transistor.

(b) Calculate the Milier capacitance and the 3dB frequency

