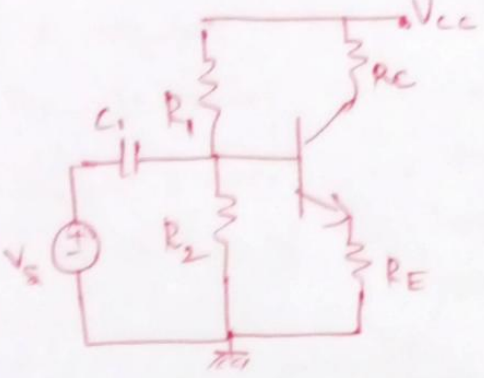
1. Consider the circuit below,

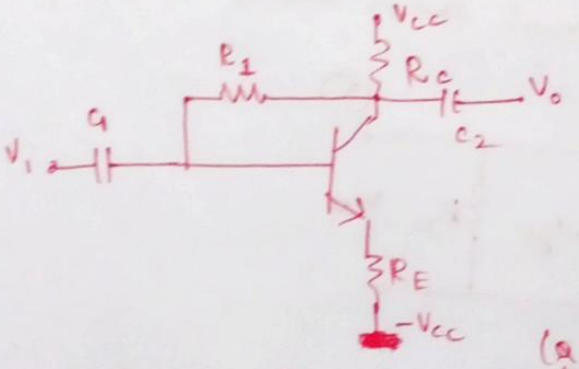


a) Derive the DC operating point (Q point) and draw the load line.

b) Draw & Derive the small signal voltage gain

c) Let $R_1 = 50\,k\Omega$, $R_2 = 10\,k\Omega$, $R_C = 2\,k\Omega$, $R_E = 0.4\,k\Omega$, $V_{CC} = 12V$, $V_{BE(on)} = 0.7V$ and $\beta = 100$. Determine the small signal voltage gain.

2. Consider the circuit below,



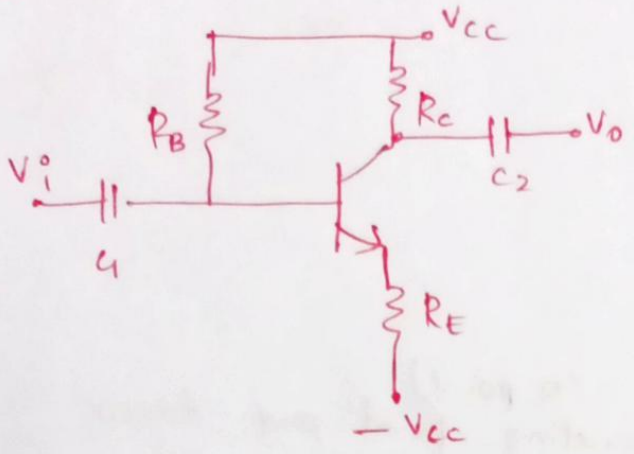
a) Derive the DC operating pt (Q point) & draw the load line

b) Draw & Derive the small signal voltage gain

c) Let $C_1 = C_2 = 1\mu F$, $R_1 = 100\,k\Omega$, $R_C = 10k\Omega$, $R_E = 1k\Omega$, $V_{CC} = 10V$. Find the Q point and small signal voltage gain

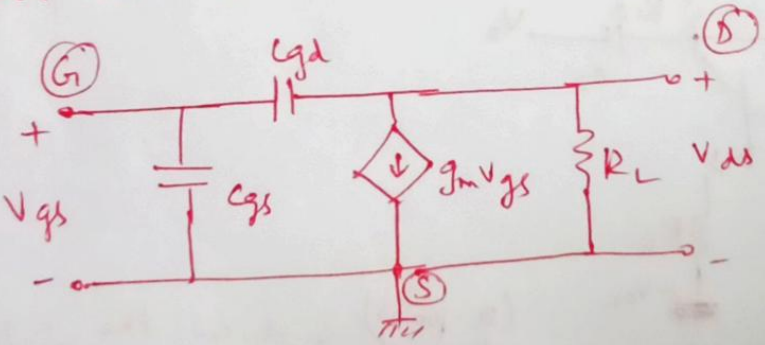
d) Repeat part c, with $-V_{CC} = 0$

3. Consider the circuit shown below,



1. Find the DC operating point and draw the load line
2. Find the small signal voltage gain
3. Find the input and output resistance
4. Let $R_B = 500K$, $R_C = 5K$, $R_E = 1K$, $V_{CC} = 20V$, $\beta = 100$, $V_A = \infty$, find the small signal voltage gain.
5. Repeat part (4) if $V_A = 100V$

4. Consider the equivalent circuit shown below,



i) Derive the Miller capacitance for the circuit

ii) Derive the cutoff frequency f_T of a MOSFET