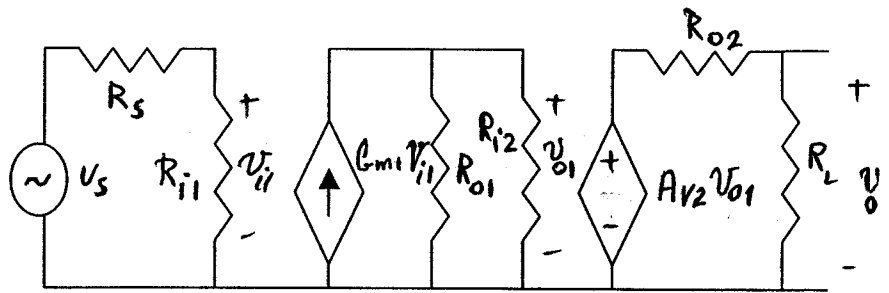


(ECE3455, Sec.2201, Q1) In the amplifier shown, a transconductance amp. is cascaded with a voltage amp. Find:

a) V_{i1}/V_s b) V_{o1}/V_{i1} c) V_o/V_{o1} d) V_o/V_s
 $R_s=10[K]$, $R_{i1}=5[K]$, $R_{o1}=10[K]$, $R_{i2}=20[K]$
 $R_{o2}=30[K]$, $R_L=10[K]$, $G_{m1}=40[ms]$ and $A_{v2}=100[V/V]$.



solution:

$$a) \frac{V_{i1}}{V_s} = \frac{R_{i1}}{R_{i1} + R_s}$$

$$b) V_{o1} = G_{m1} V_{i1} \cdot R_{o1} \parallel R_{i2}$$

$$\frac{V_{o1}}{V_{i1}} = G_m R_{o1} \parallel R_{i2}$$

$$c) V_o = A_{v2} V_{o1} \times \frac{R_L}{R_L + R_{o2}} \quad \frac{V_o}{V_{o1}} = A_{v2} \frac{R_L}{R_L + R_{o2}}$$

$$d) \frac{V_o}{V_s} = \frac{V_{i1}}{V_s} \times \frac{V_{o1}}{V_{i1}} \times \frac{V_o}{V_{o1}}$$

$$\frac{V_o}{V_s} = \frac{R_{i1}}{R_{i1} + R_s} \times G_m \times R_{o1} \parallel R_{i2} \times A_v \times \frac{R_L}{R_L + R_{o2}}$$

$$\frac{V_o}{V_s} = \frac{5}{5 + 10} \times 40 \times \underbrace{20 \parallel 10}_{6.66} \times 100 \times \frac{10}{10 + 30} [V/V]$$

$$\frac{V_o}{V_s} = 2220 [V/V]$$