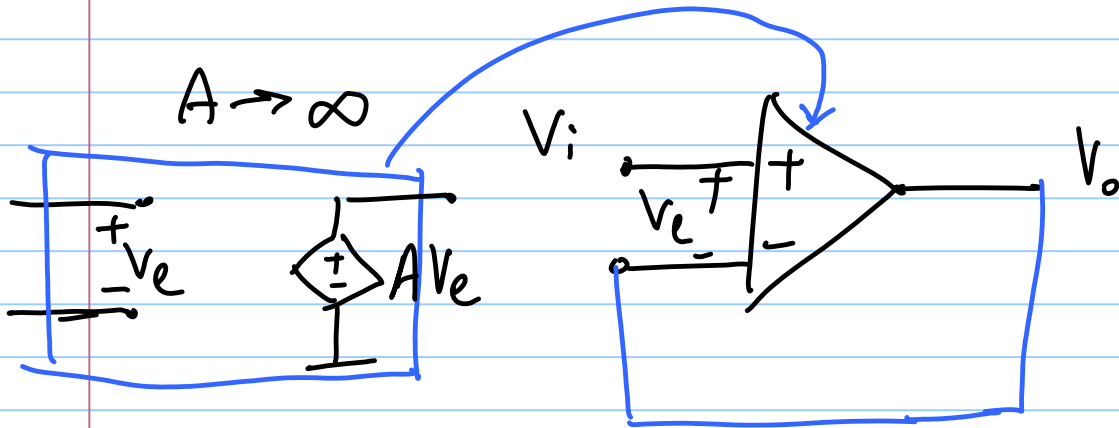


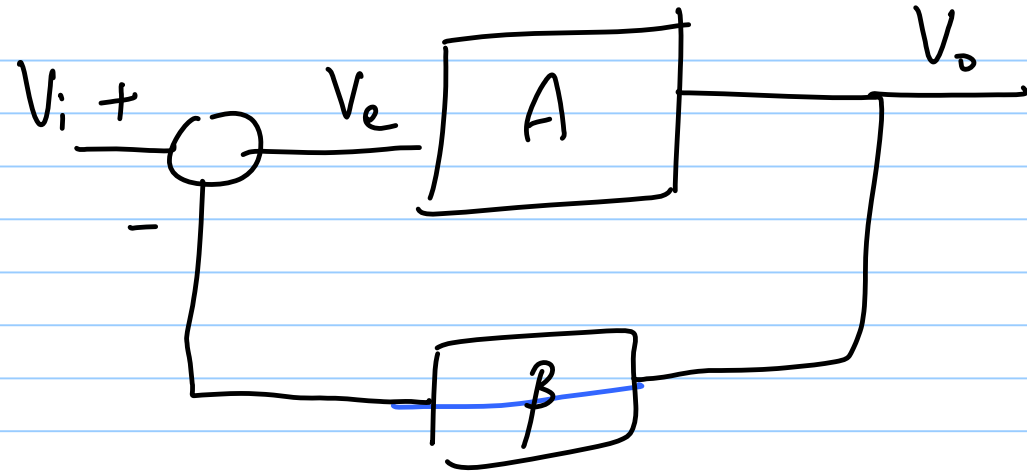
27/8/19

Lec 13

VCVS gain = 1

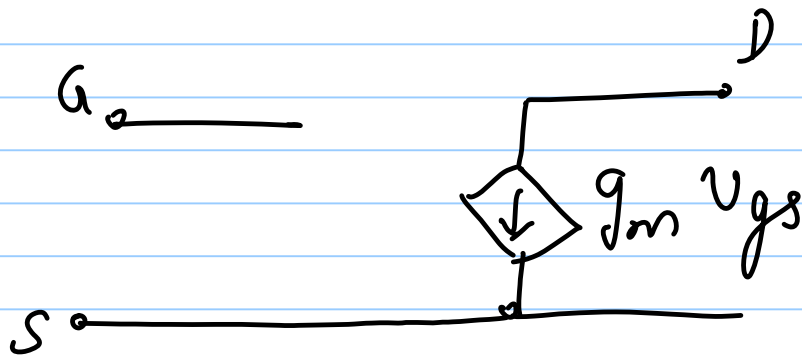


Ideal opamp: $V_e = 0 \Rightarrow V_o = V_i$



$$\frac{V_o}{V_i} = \frac{1}{\beta} \cdot \frac{A\beta}{1 + A\beta}$$

VCVS of gain = 1 using MOSFET



$$g_m \rightarrow \infty$$

$$\text{large } \frac{W}{L} \text{ \& } I_D$$

$$v_o = v_s$$

across R_L

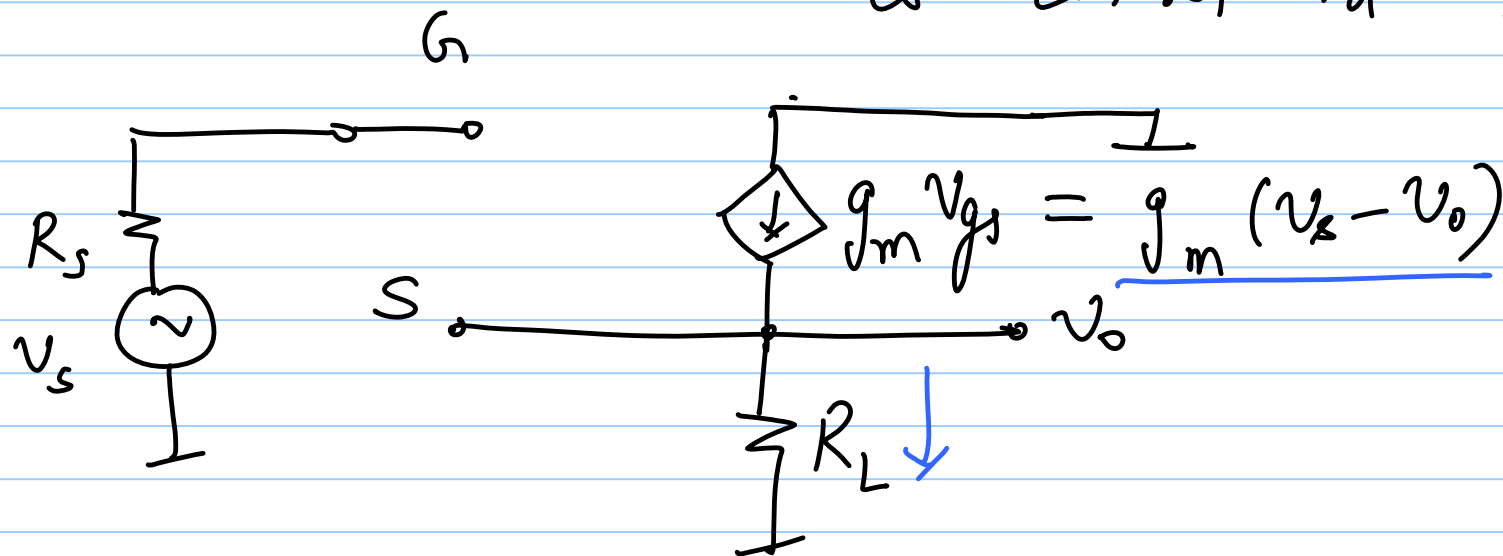
may have R_s in series

$$v_s \longrightarrow v_o$$

Sense v_o , compare with v_s

→ $(v_o - v_s)$

use mag. & sign of $(v_o - v_s)$
to control i_d → control v_o

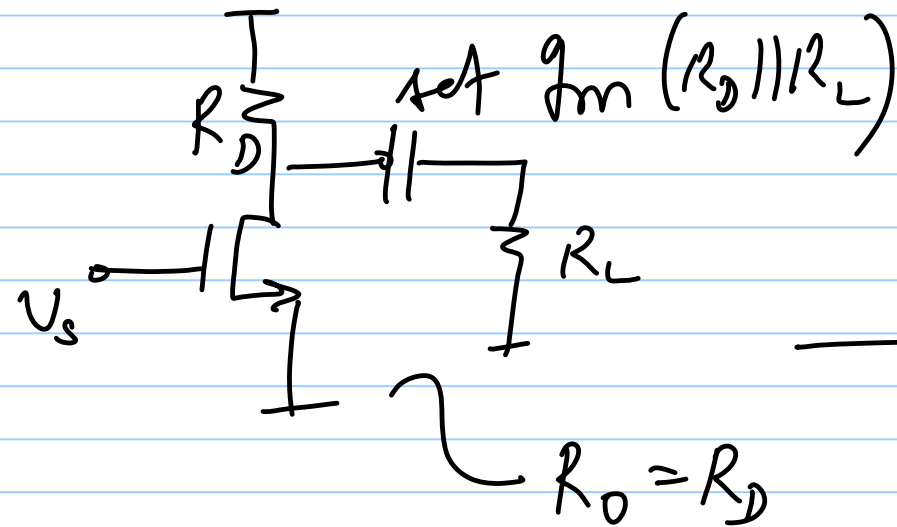


$$g_m (v_s - v_o) = \frac{v_o}{R_L}$$

$$v_s = v_o \left[1 + \frac{1}{g_m R_L} \right]$$

$$\frac{v_o}{v_s} = \frac{g_m R_L}{1 + g_m R_L} \approx 1 \quad \text{if} \quad g_m R_L \gg 1$$

$$g_m \gg \frac{1}{R_L}$$

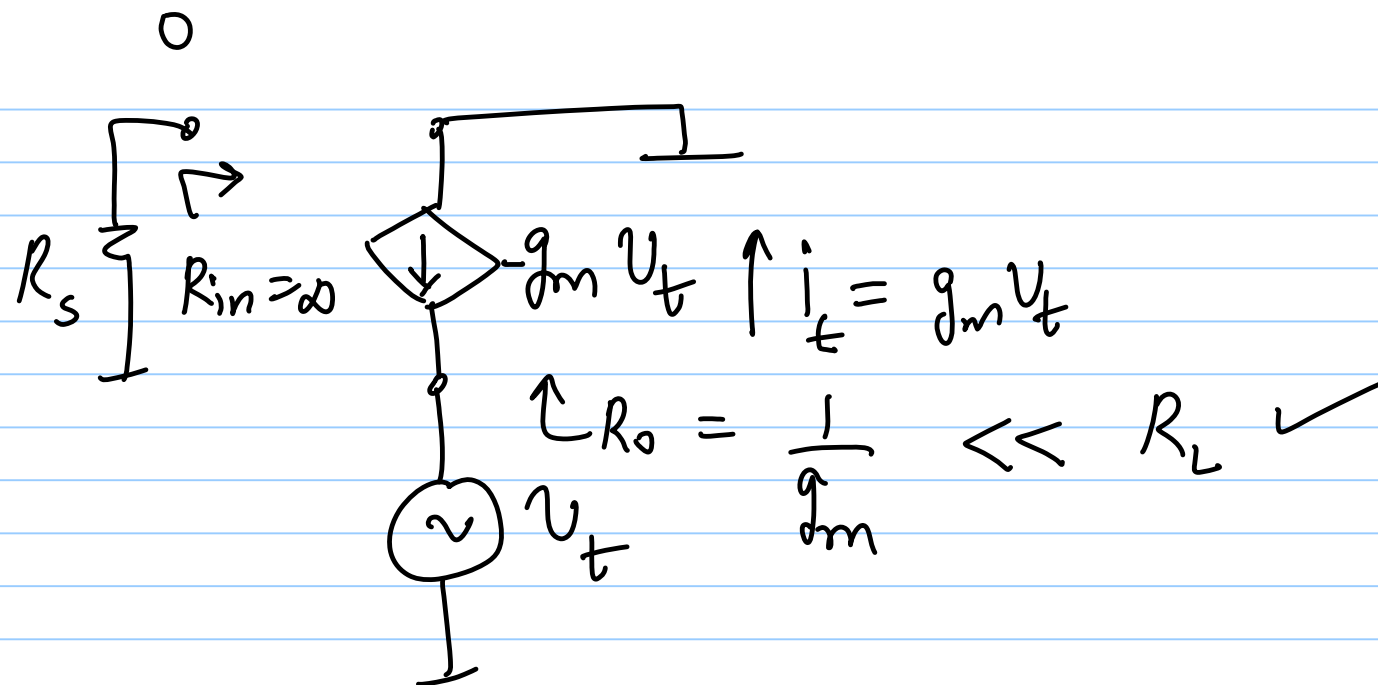


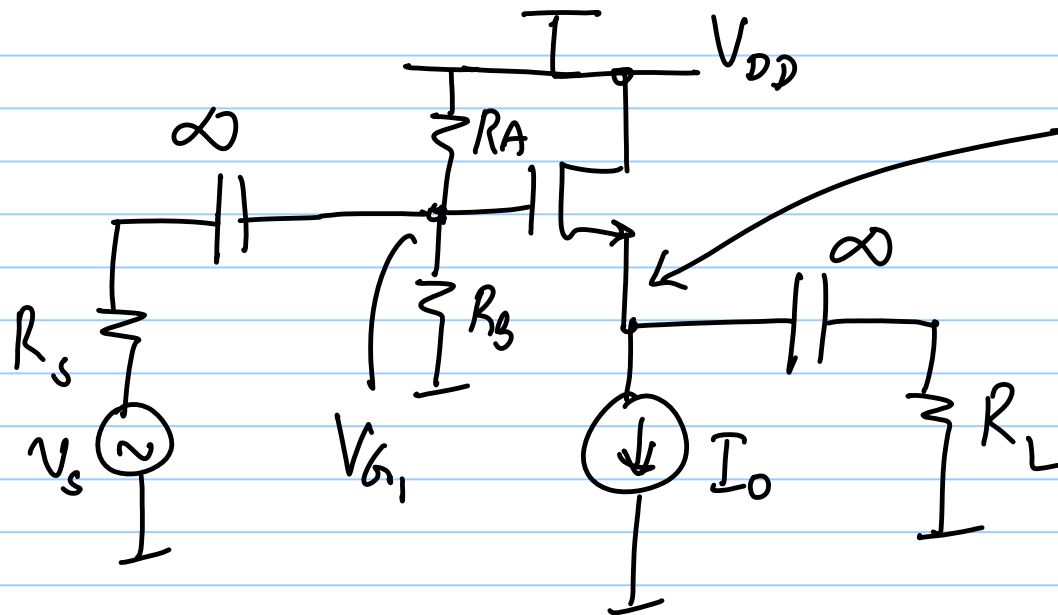
VCVS

$$gain = 1$$

$$R_{in} = \infty$$

$$\rightarrow \times R_o = 0$$





$$I_s = I_o$$

$$V_x = V_{G1} - V_{GS} | I_o$$

