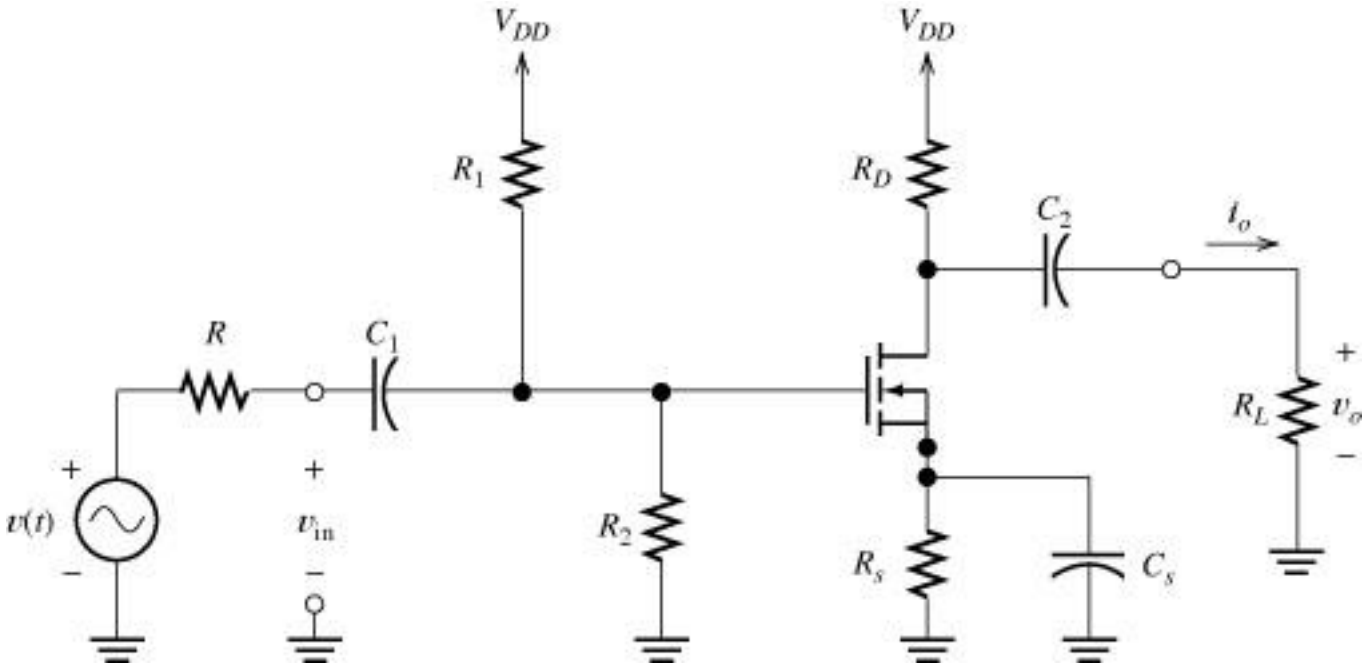
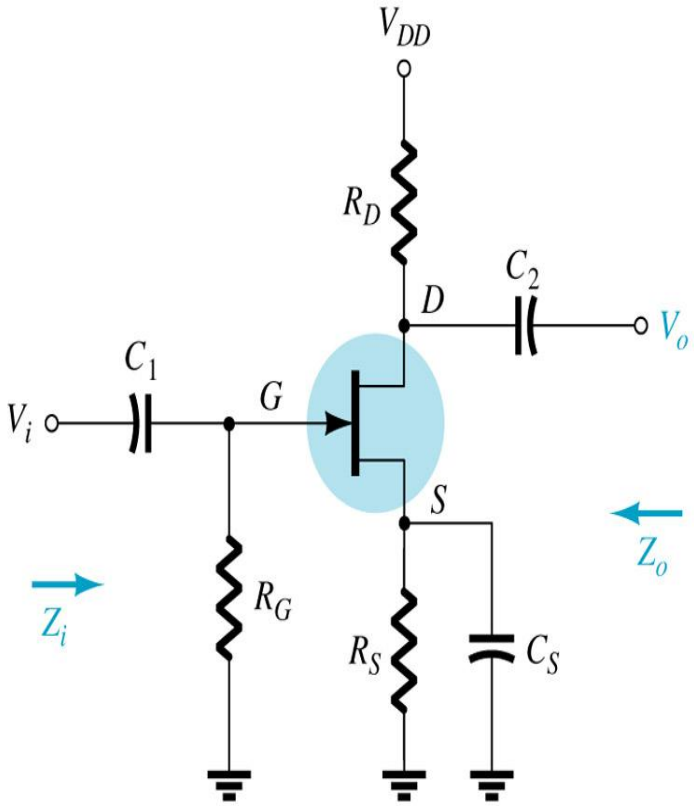
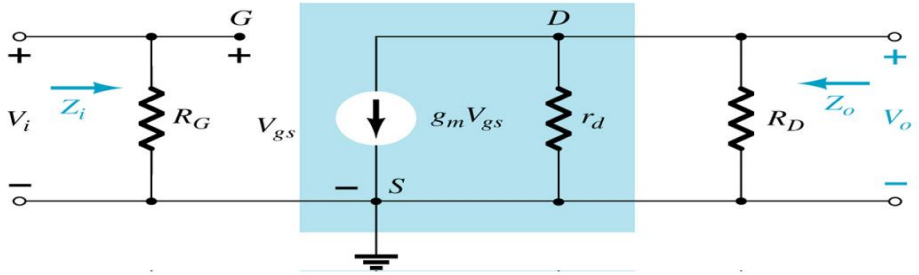


Figure Common-source amplifier.

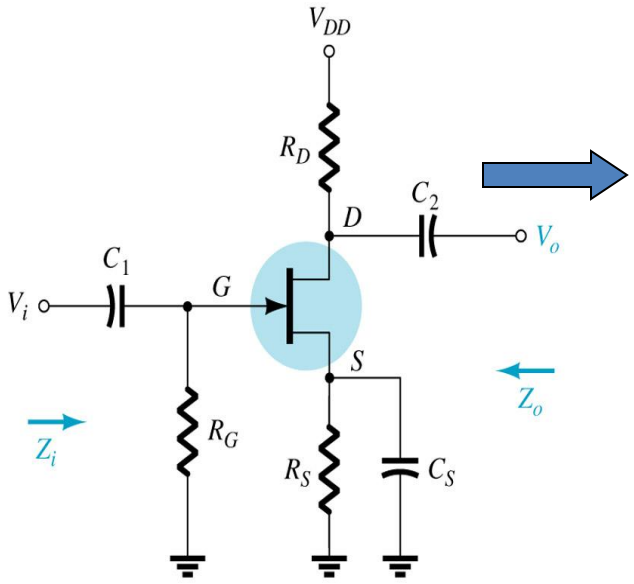


For drawing an a c equivalent circuit of Amp.

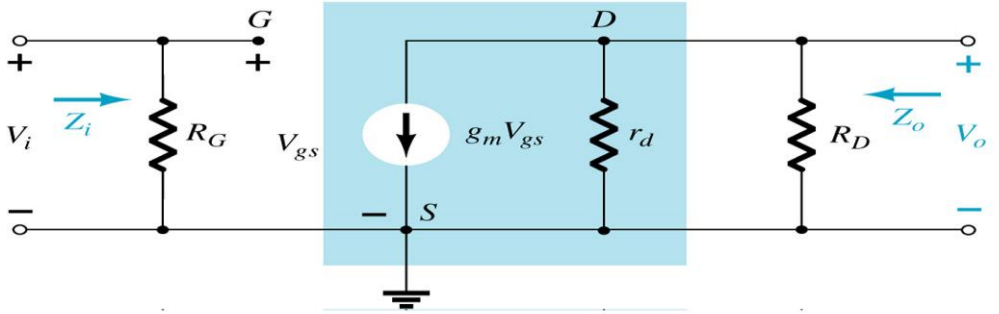
- Assume all Capacitors C1, C2, Cs as short circuit elements for ac signal
- Short circuit the d c supply
- Replace the FET by its small signal model



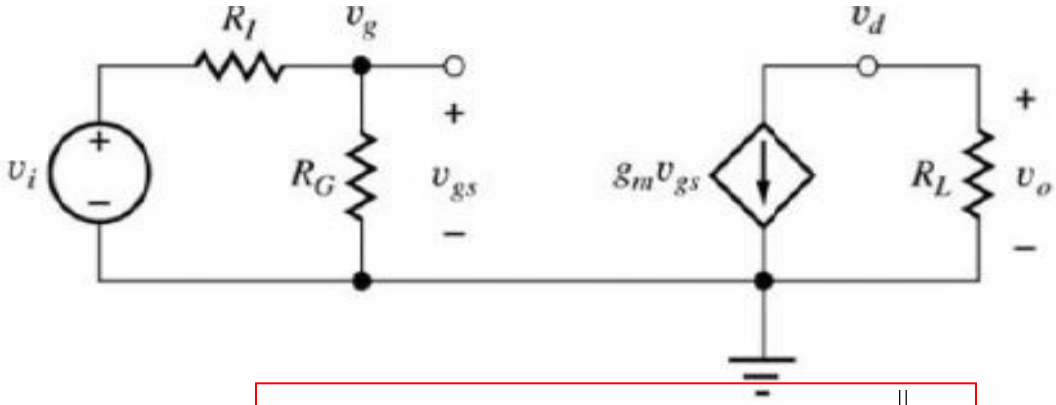
Analysis of CS Amplifier



A C Equivalent Circuit



Simplified A C Equivalent Circuit



Voltage gain, $A_v = \dfrac{v_o}{v_{gs}}$

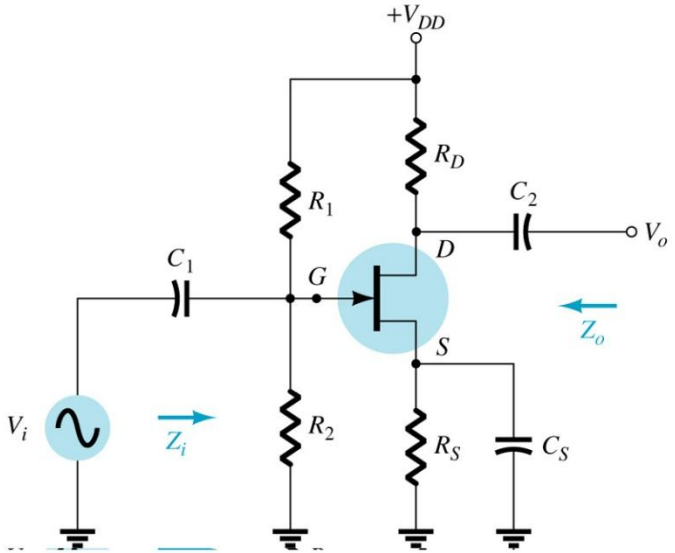
$\therefore v_o = i_o R_L = -g_m v_{gs} R_L$

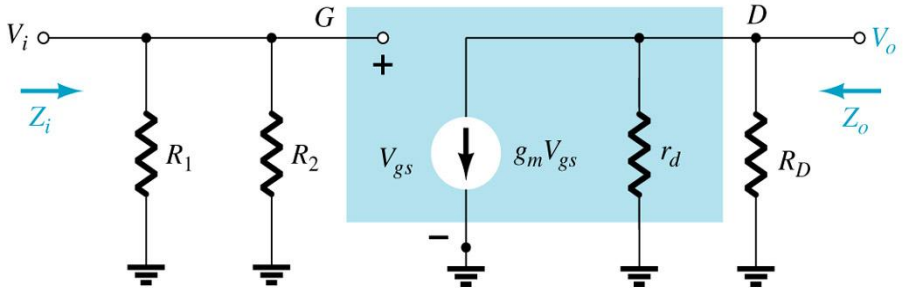
$\therefore A_v = \dfrac{v_o}{v_{gs}} = -g_m R_L,\ R_L = R_D \| r_d$

Input imp., $Z_{in} = R_G = R_1 \| R_2$

Out put imp., $Z_o = r_d \| R_D = \dfrac{r_d R_D}{r_d + R_D}$

Analysis of CS Amplifier with Potential Divider Bias





This is a CS amplifier configuration therefore the input is on the gate and the output is on the drain.

$$Av = -g_m(r_d \,||\, R_D)$$

$$Av \cong -g_m R_D, \quad \because r_d \geq 10R_D$$

$$Zi = R_1 \,||\, R_2$$

$$Zo = r_d \,||\, R_D$$

$$Zo \cong R_D \quad r_d \geq 10R_D$$