

BJT transistors



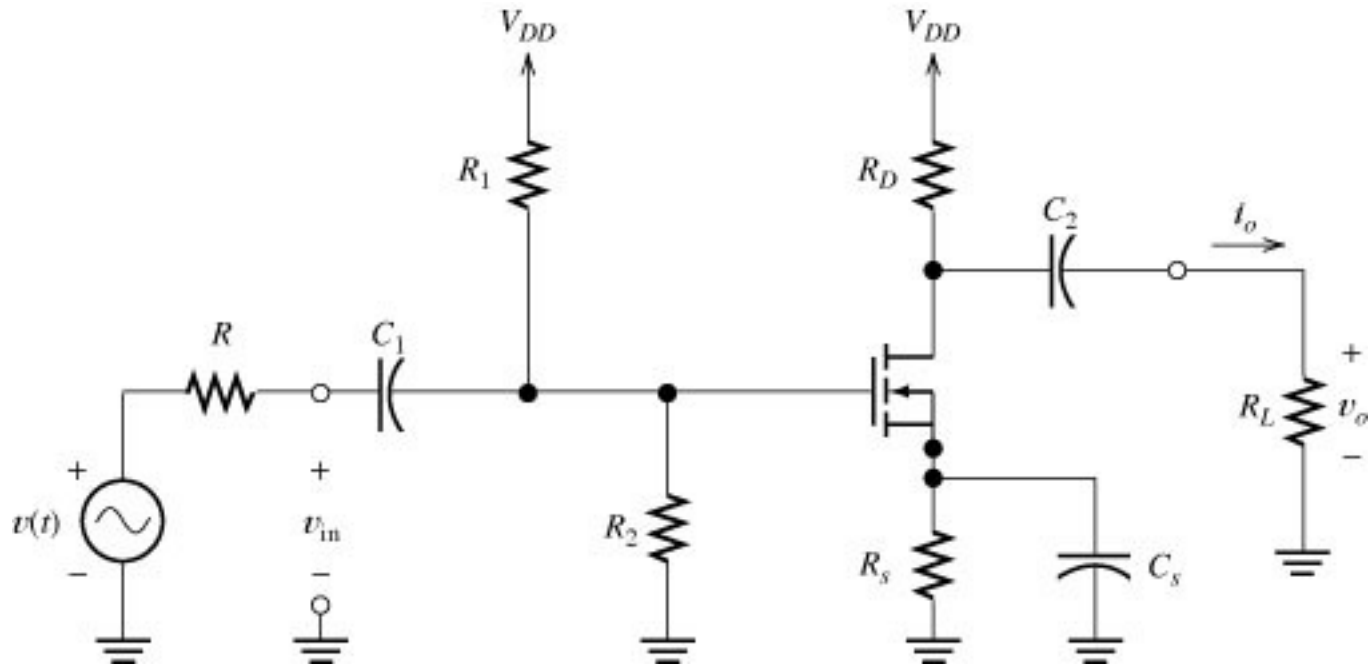
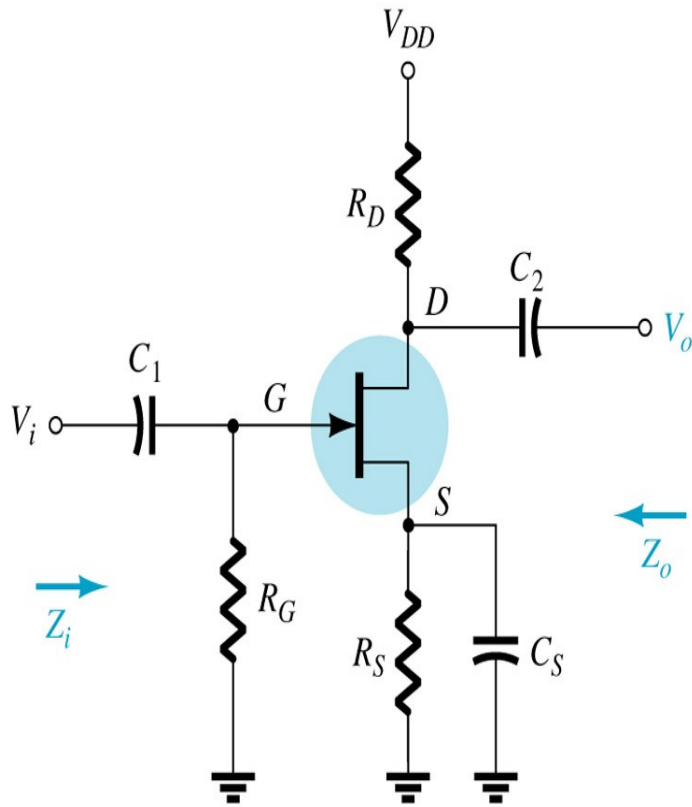
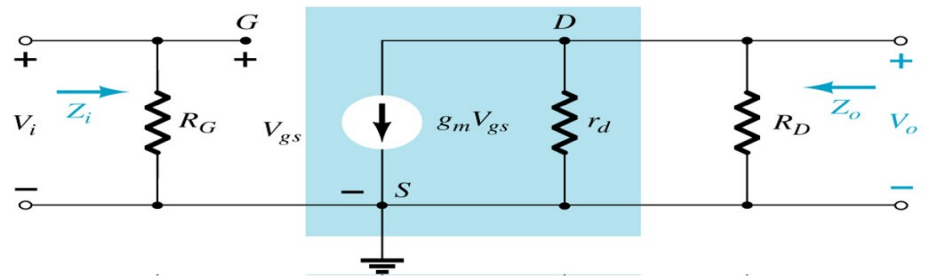


Figure Common-source amplifier.

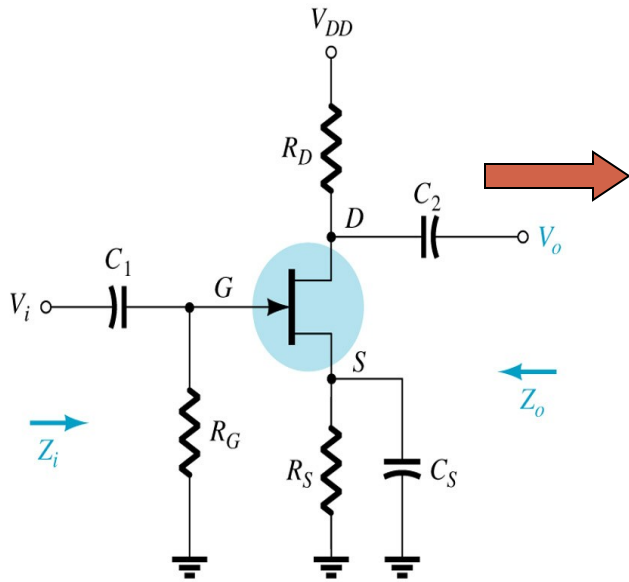


For drawing an ac equivalent circuit of Amp.

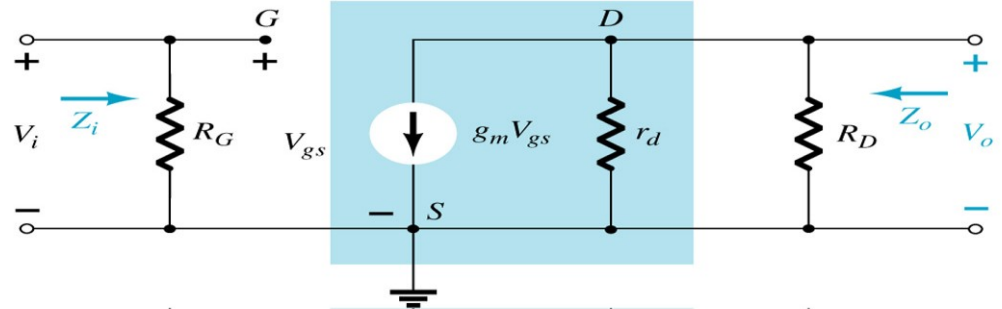
- Assume all Capacitors C_1 , C_2 , C_S as short circuit elements for ac signal
- Short circuit the d c supply
- Replace the FET by its small signal model



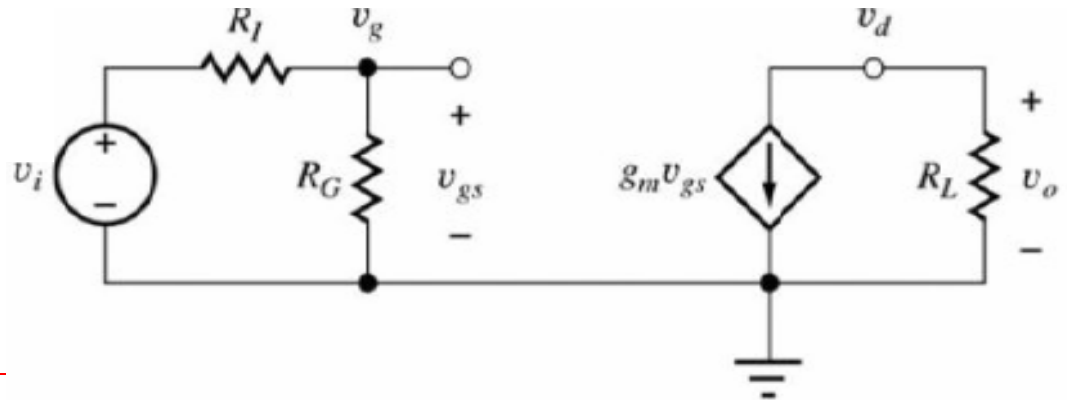
Analysis of CS Amplifier



A C Equivalent Circuit



Simplified A C Equivalent Circuit



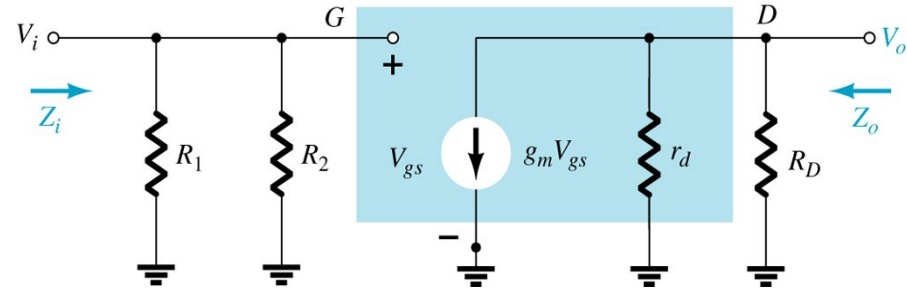
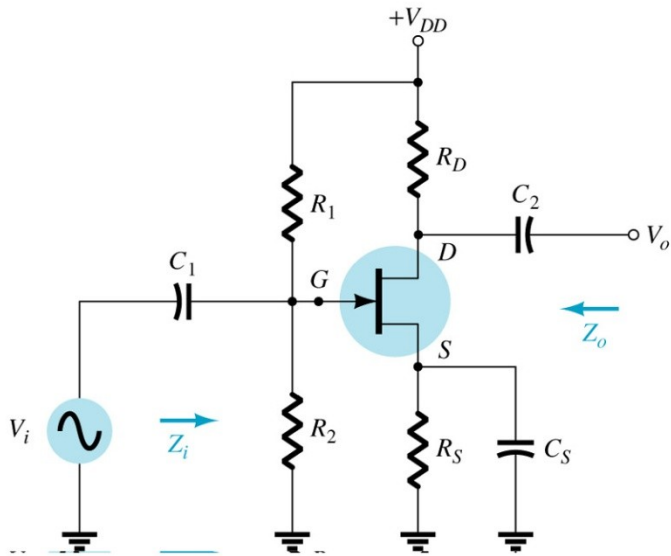
Voltage gain, $A_v = \frac{v_o}{v_{gs}}$

Output imp., $Z_o = R_D \parallel r_d = \frac{r_d \cdot R_D}{r_d + R_D}$

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

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

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.

$$A_v = -g_m(r_d \parallel R_D)$$

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

$$Z_i = R_1 \parallel R_2$$

$$Z_o = r_d \parallel R_D$$

$$Z_o \cong R_D \quad / \quad r_d \geq 10 R_D$$



**Thank
You**