



Fundumantal of Electronic II

Second Class

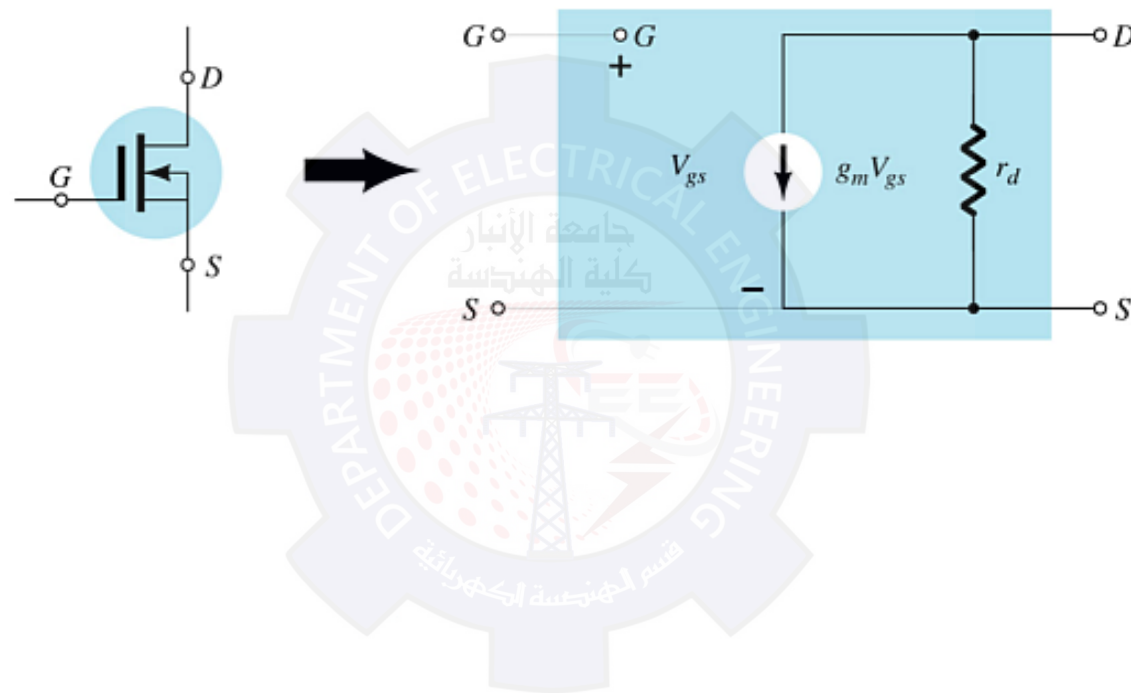
Chapter08: FET Amplifier

Lec08_p3

Munther N. Thiyab

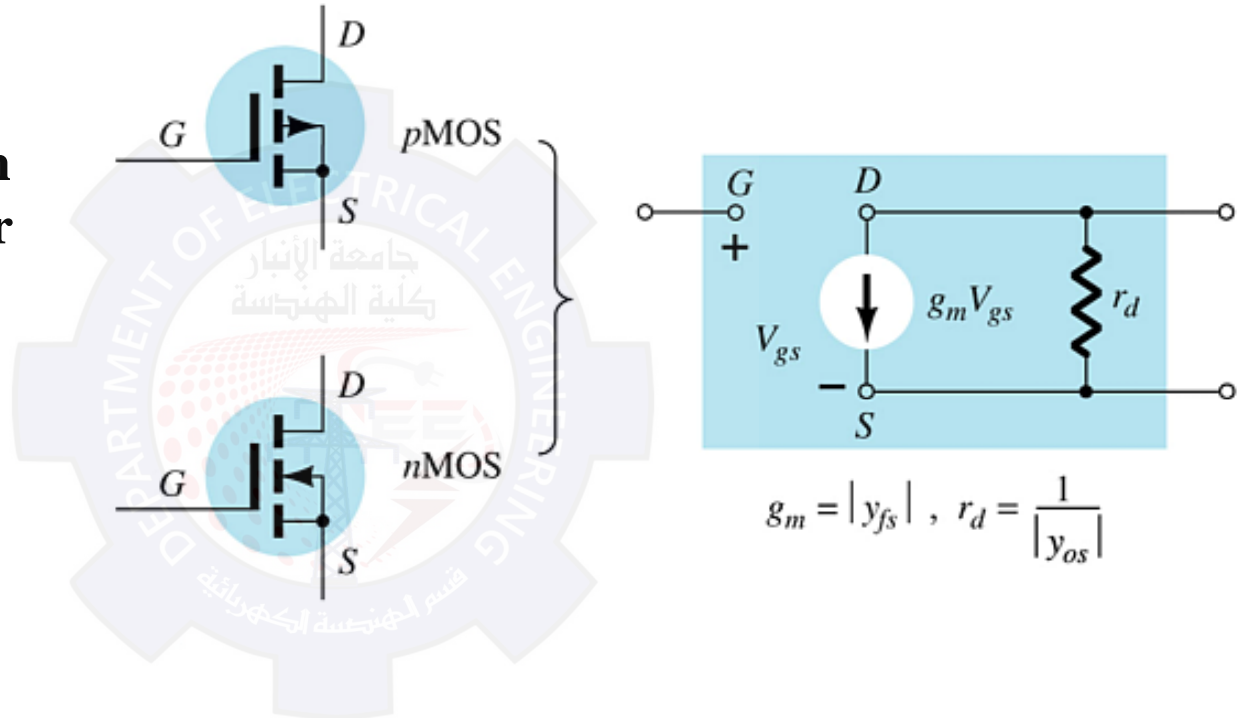
2019-2020

D-Type MOSFET AC Equivalent



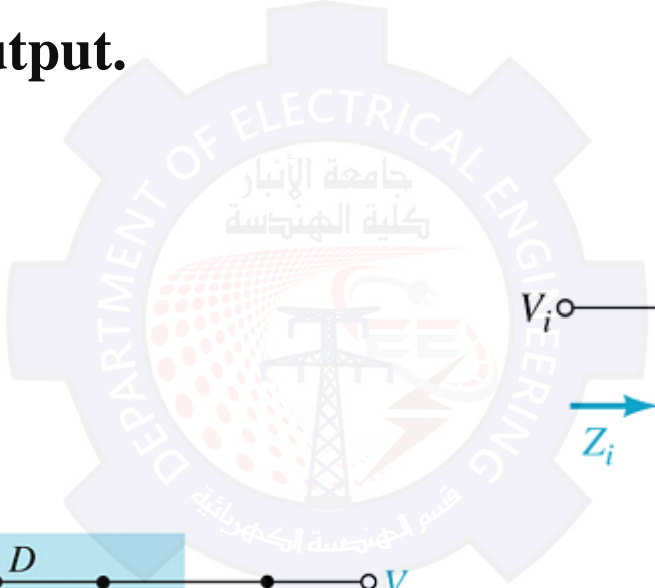
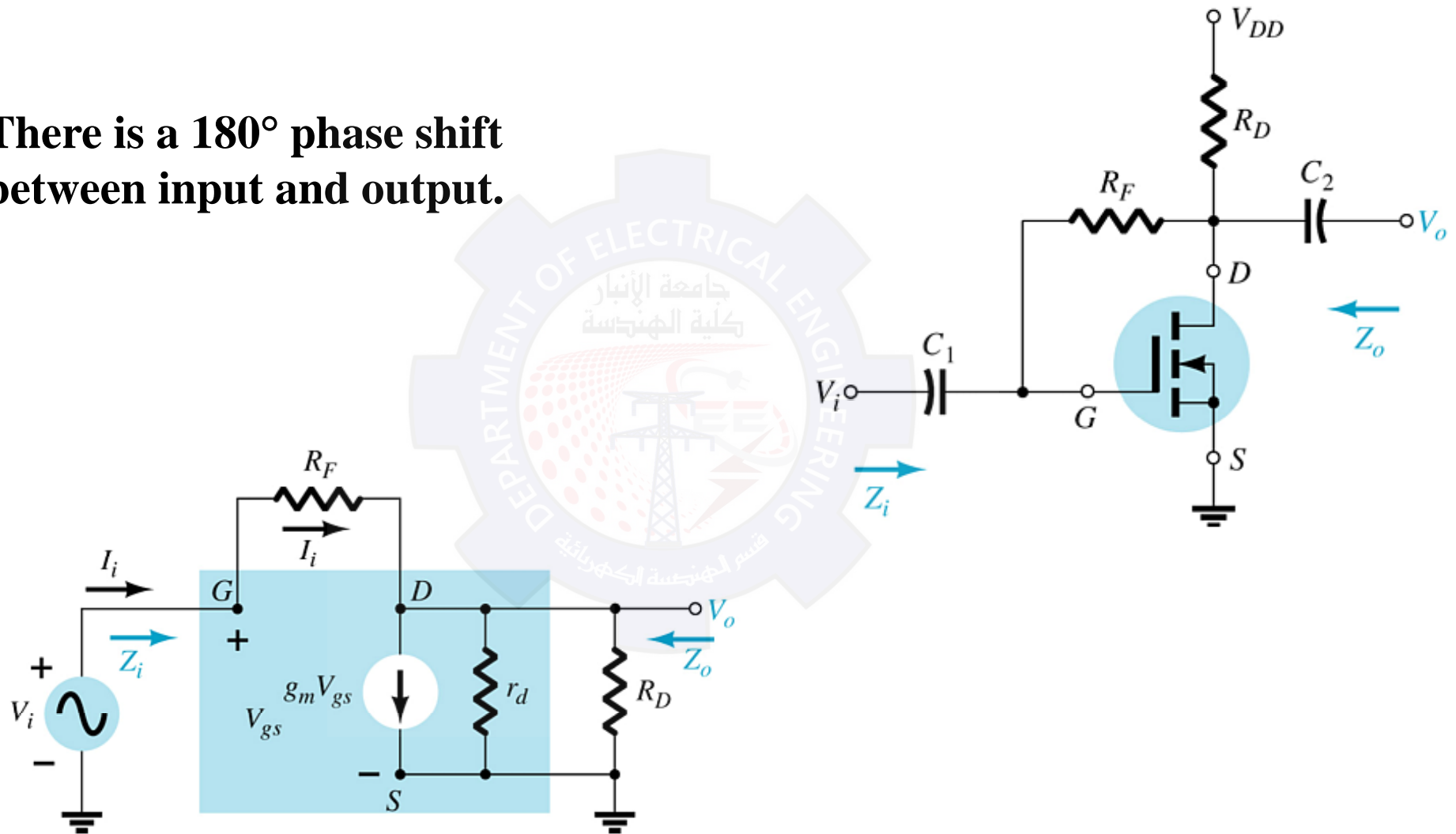
E-Type MOSFET AC Equivalent

g_m and r_d can be found in the specification sheet for the FET.



Common-Source Drain-Feedback

There is a 180° phase shift between input and output.



Calculations

Input impedance:

$$Z_i = \frac{R_F + r_d \parallel R_D}{1 + g_m (r_d \parallel R_D)}$$

$$Z_i \cong \frac{R_F}{1 + g_m R_D} \Big| R_F \gg r_d \parallel R_D, r_d \geq 10R_D$$

Output impedance:

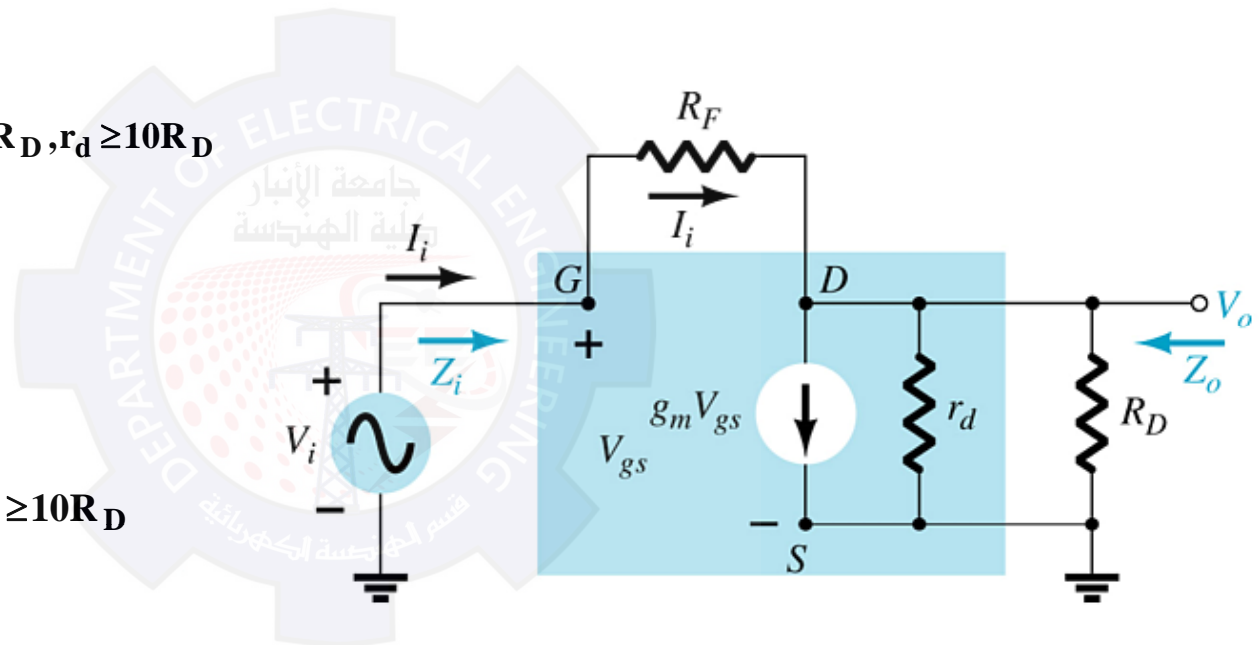
$$Z_o = R_F \parallel r_d \parallel R_D$$

$$Z_o \cong R_D \Big| R_F \gg r_d \parallel R_D, r_d \geq 10R_D$$

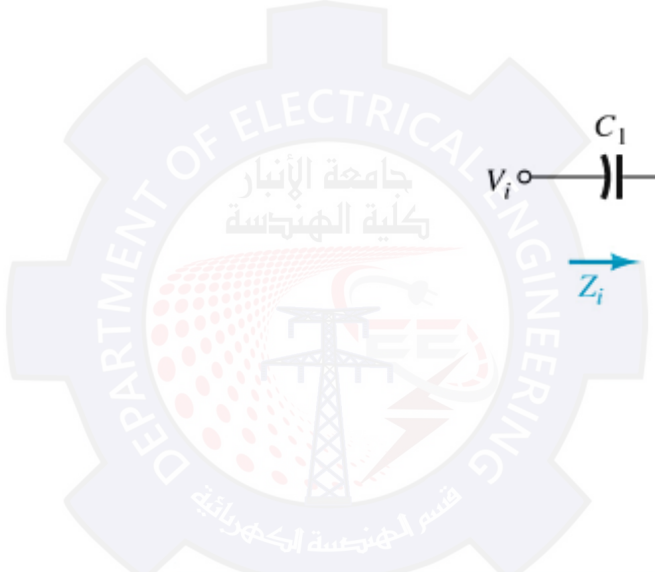
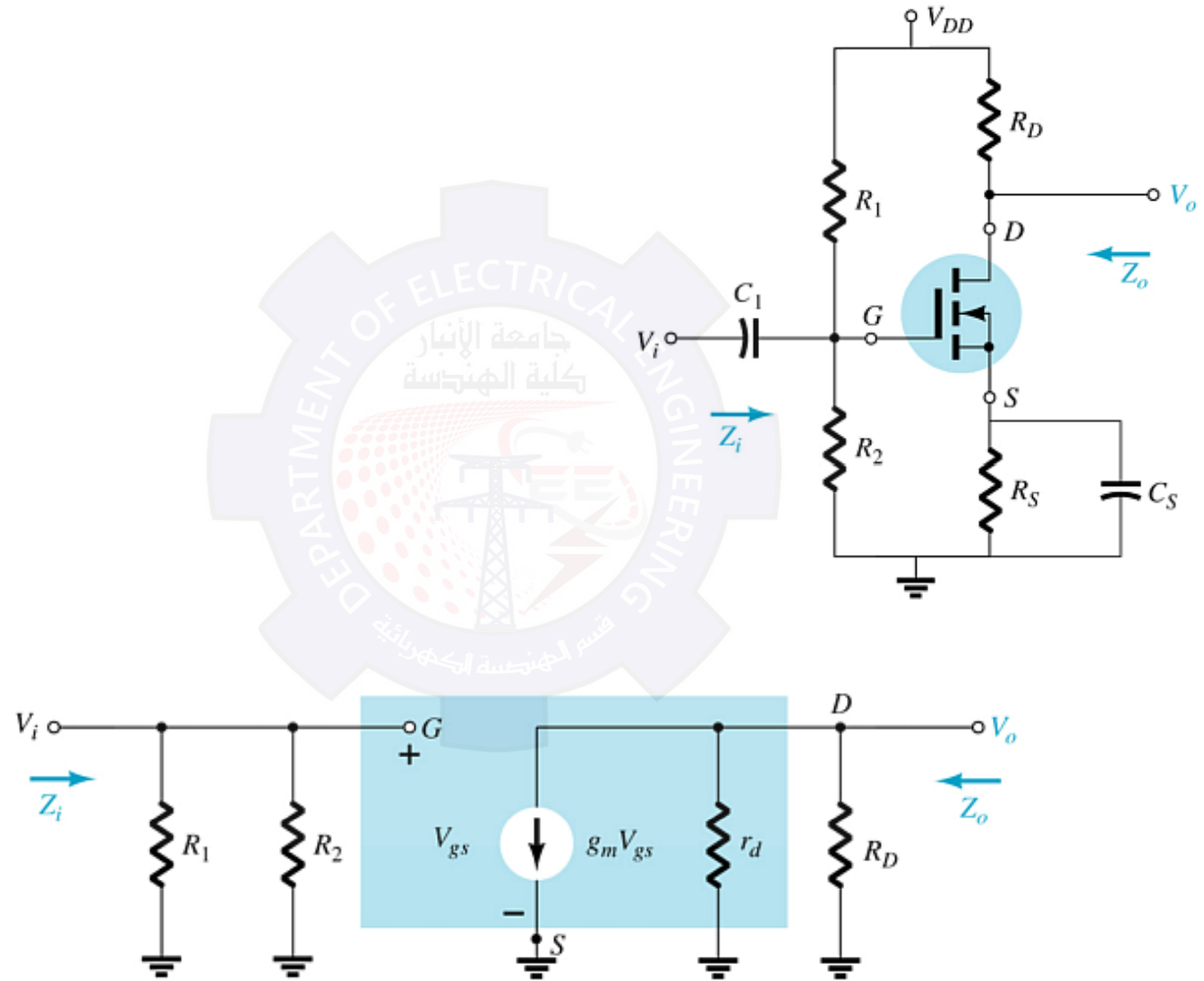
Voltage gain:

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

$$A_v \cong -g_m R_D \Big| R_F \gg r_d \parallel R_D, r_d \geq 10R_D$$



Common-Source Voltage-Divider Bias



Calculations

Input impedance:

$$Z_i = R_1 \parallel R_2$$

Output impedance:

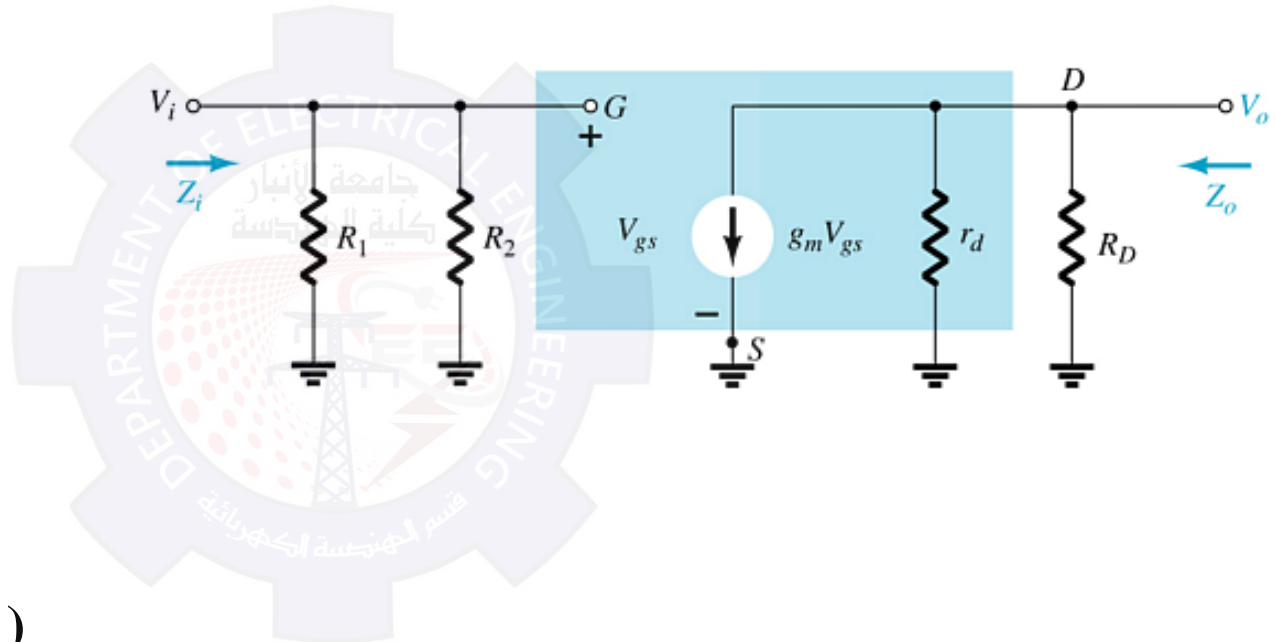
$$Z_o = r_d \parallel R_D$$

$$Z_o \cong R_D \mid r_d \geq 10R_D$$

Voltage gain:

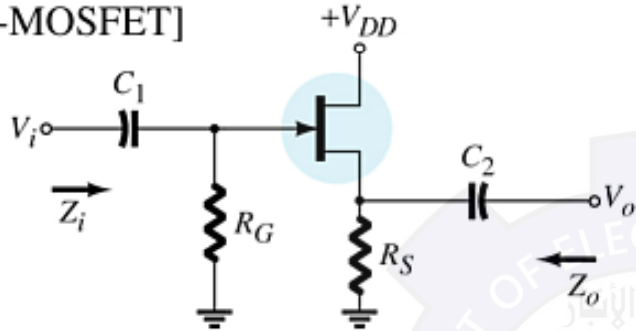
$$A_v = -g_m (r_d \parallel R_D)$$

$$A_v \cong -g_m R_D \mid r_d \geq 10R_D$$

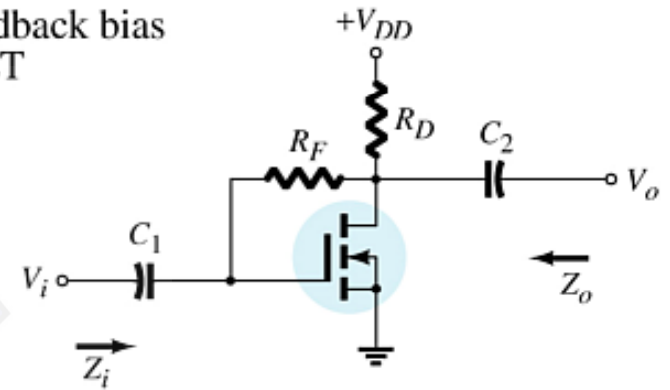


Summary Table

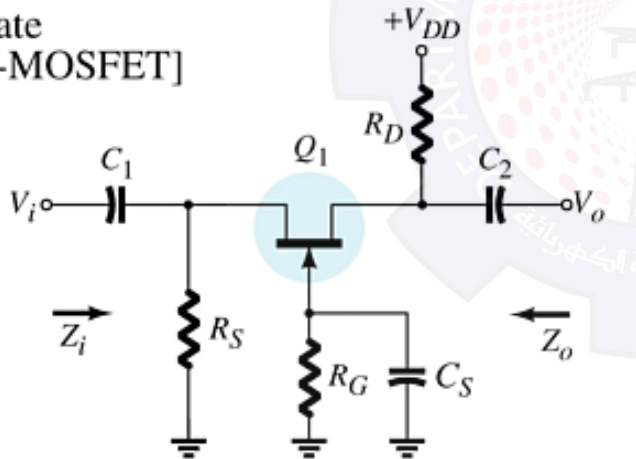
Source-follower
[JFET or D-MOSFET]



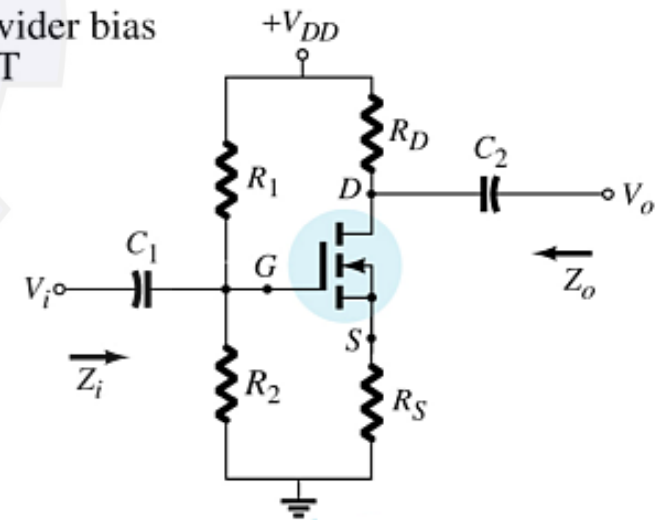
Drain-Feedback bias
E-MOSFET



Common-gate
[JFET or D-MOSFET]



Voltage-divider bias
E-MOSFET



more...