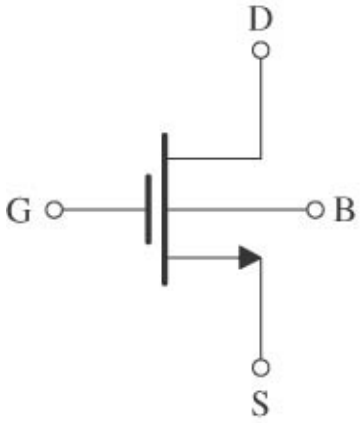
Faculty of Engineering

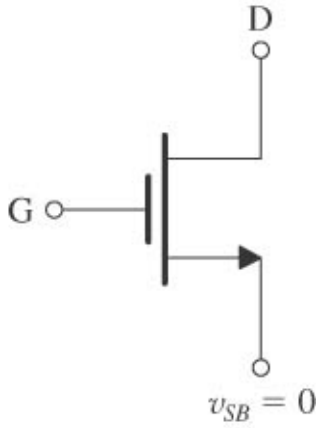
ECE 335: Electronic Circuits

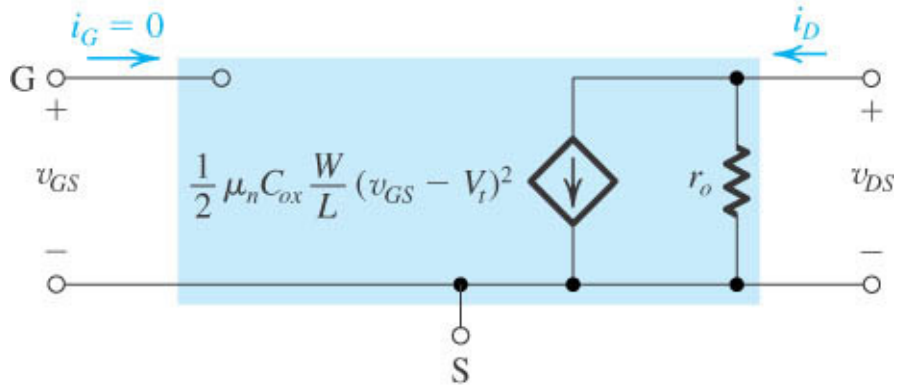
Lecture 7:
MOSFET DC Circuits

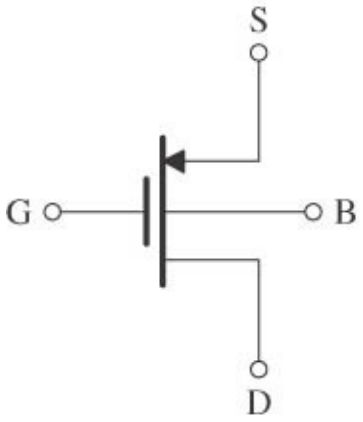
- Based on content from Sedra/Smith “Microelectronic Circuits” - Fifth Edition

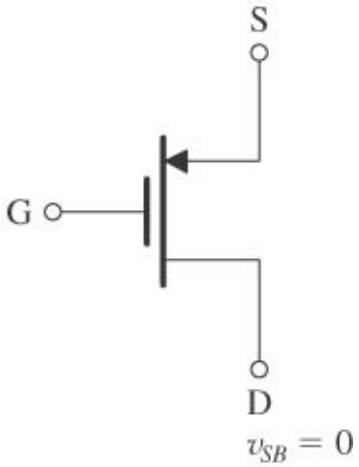
Summary

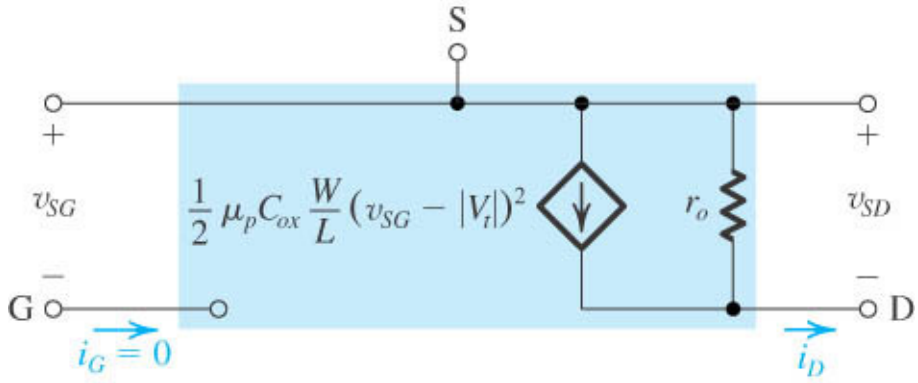

D
G
B
S


D
G
$v_{SB} = 0$


$i_G = 0$
i_D
G
+
v_{GS}
–
$\frac{1}{2}\mu_n C_{ox}\frac{W}{L}(v_{GS} - V_t)^2$
r_o
+
v_{DS}
–
S

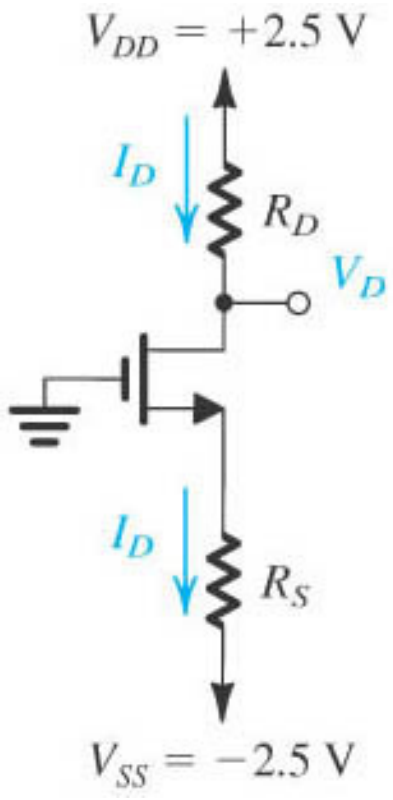

S
G
B
D


S
G
D
$v_{SB} = 0$


S
+
v_{SG}
–
G
$i_G = 0$
$\frac{1}{2}\mu_p C_{ox}\frac{W}{L}(v_{SG} - |V_t|)^2$
r_o
+
v_{SD}
–
D
i_D

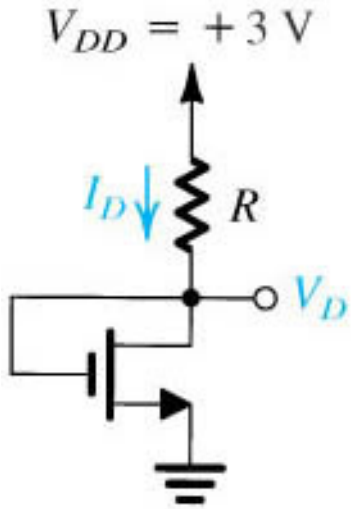
Example (1)

R_D= 2 kΩ
R_S= 1 kΩ
V_t = 1V
k_n = 1mA/V^2



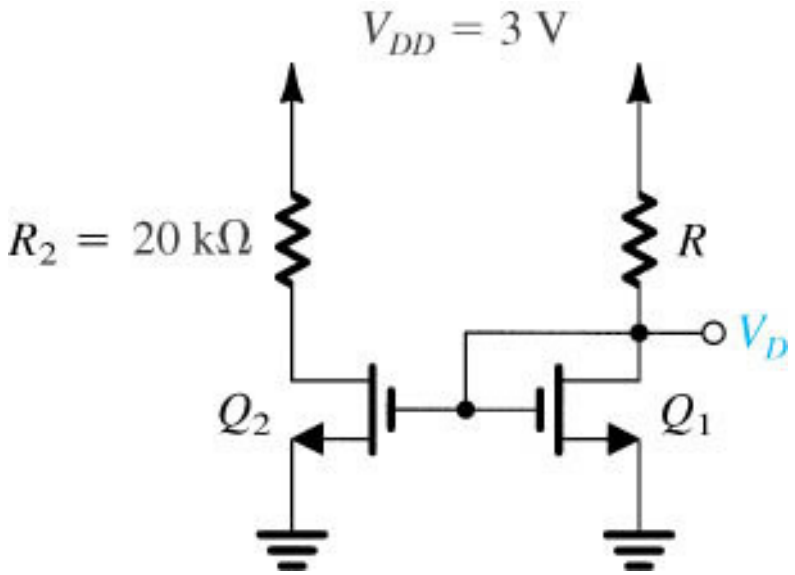
Example (2)

$R = 2\ k\Omega$
$V_t = 1V$
$k_n = 1mA/V^2$

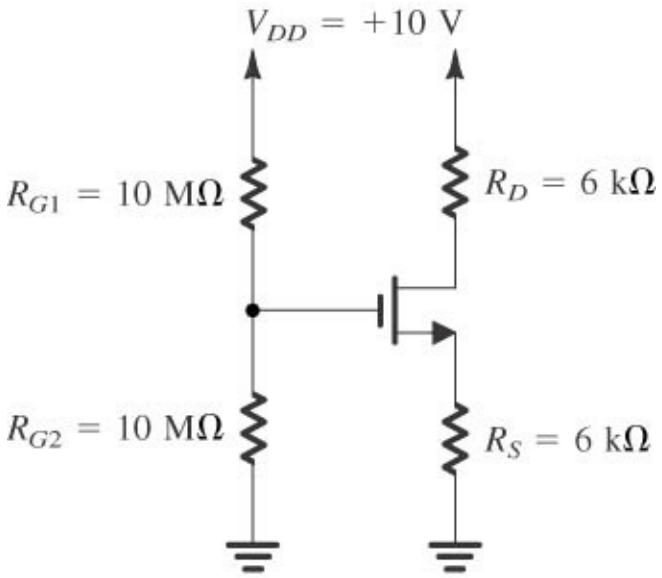


Example (3)

I_R/I_{R2}=?



Example (4)

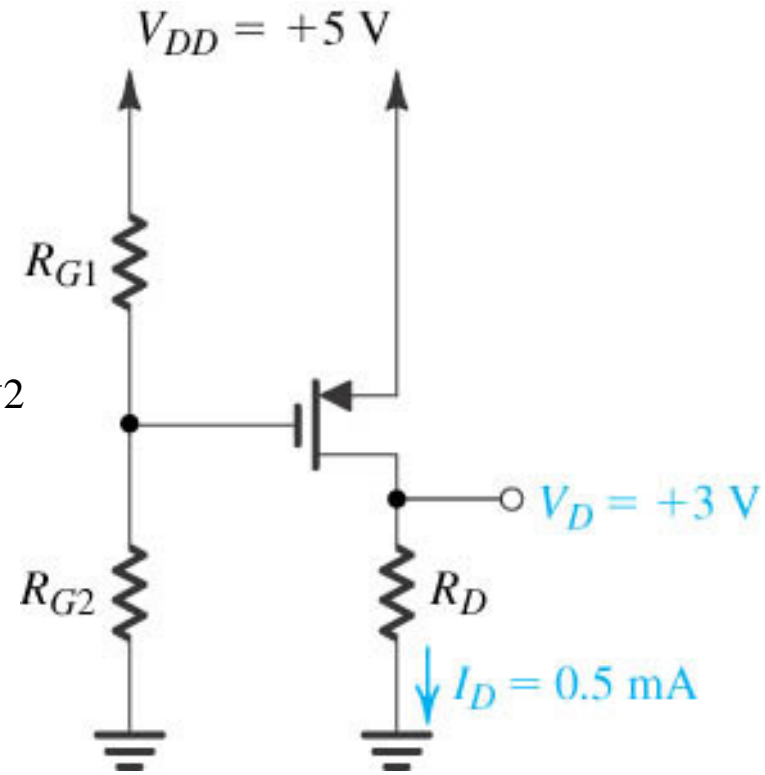


(a)

Example (5)

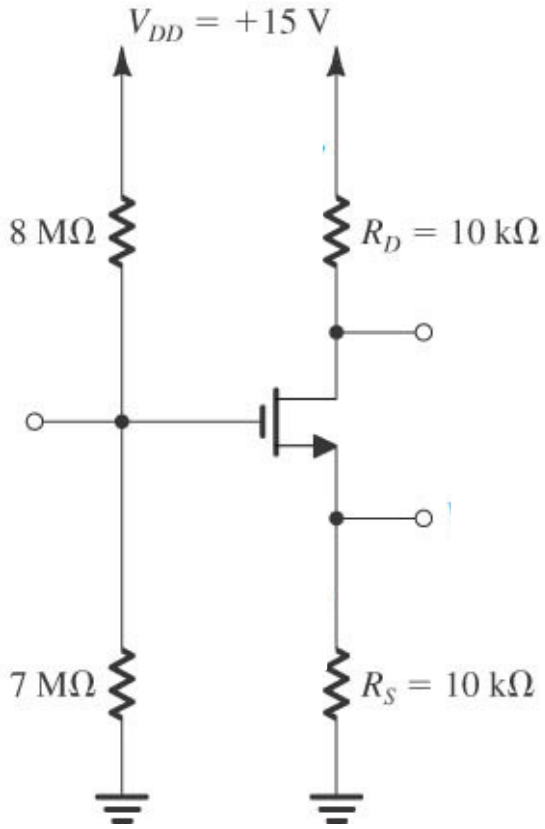
$V_t = 1V$

$|k_p| = 1mA/V^2$



Example (6)

$V_t = 1V$
$k_n = 1mA/V^2$



Load Line

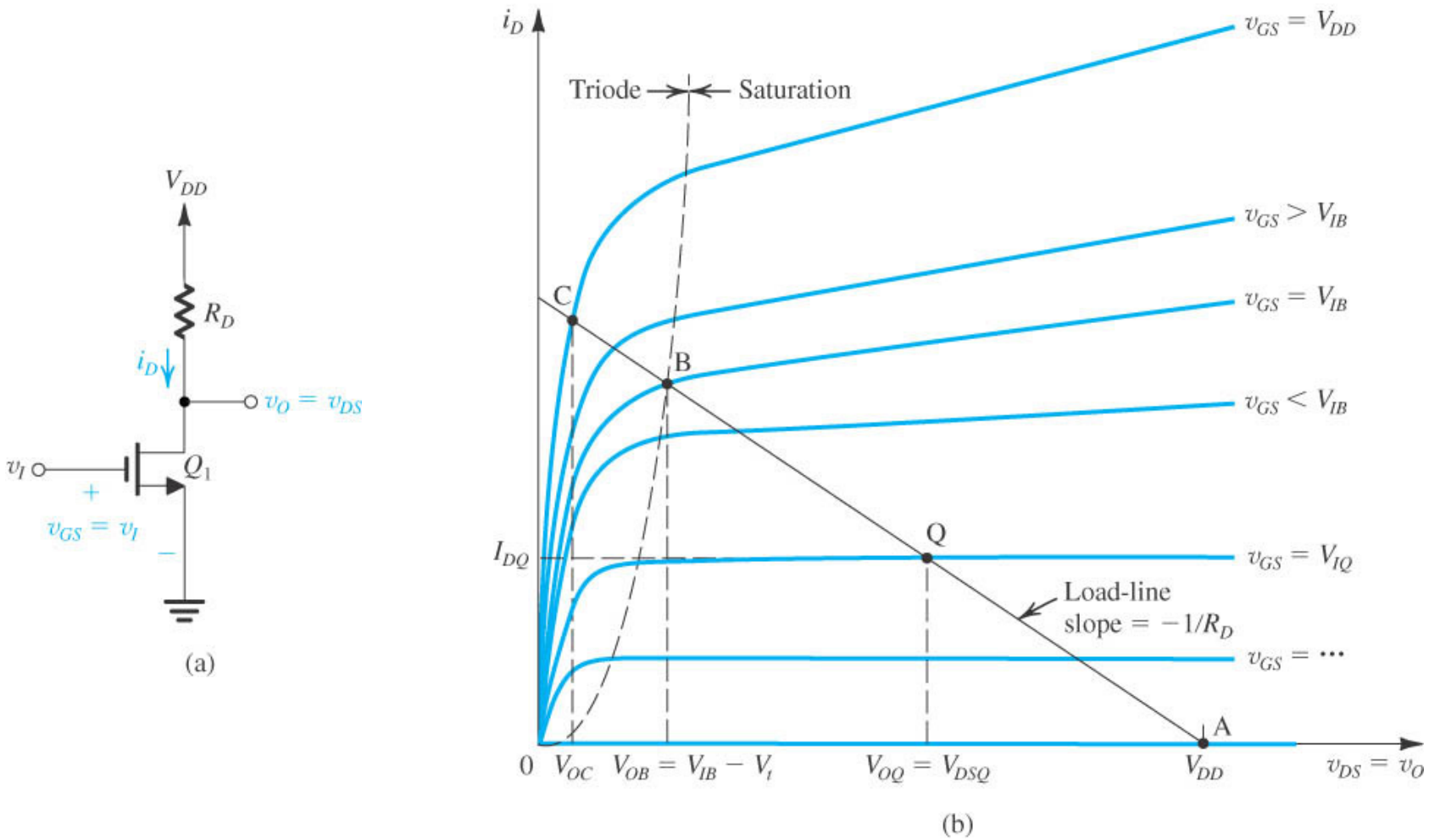


Figure 4.26 **(a)** Basic structure of the common-source amplifier. **(b)** Graphical construction to determine the transfer characteristic of the amplifier in (a).