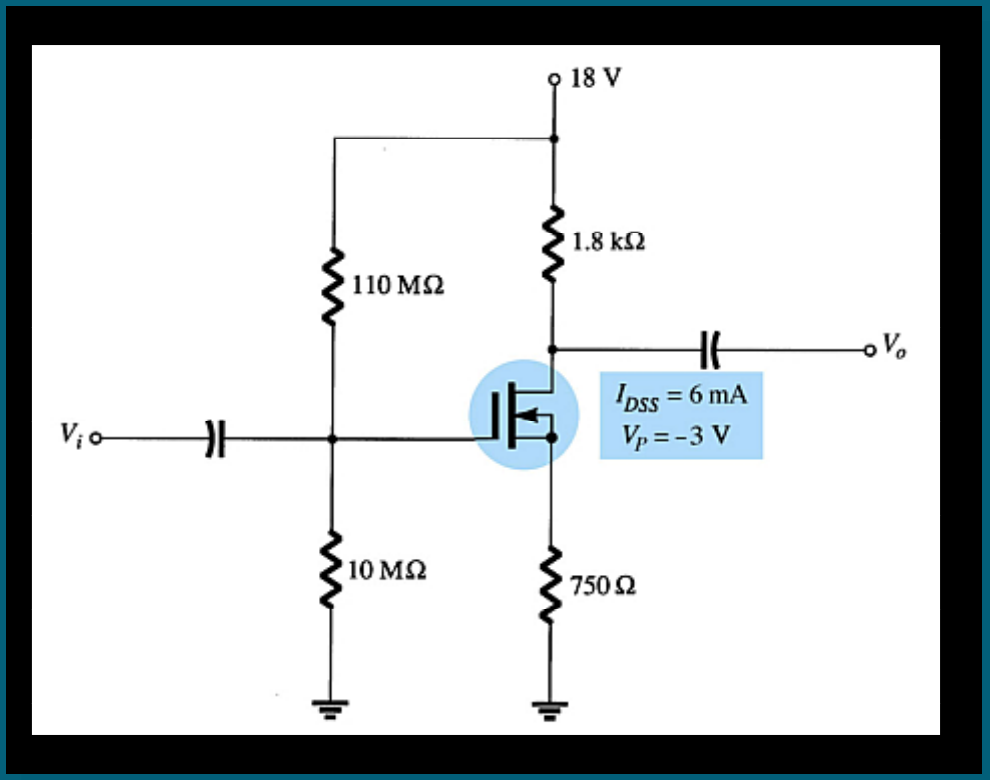
EE-202 Electronics-I-

Chapter 13:

MOSFET DC Biasing Circuits

Depletion-type MOSFET bias circuits

Depletion-type MOSFETs can operate with positive values of V_{GS} and I_D values that exceed I_{DSS}.



Self-Bias

Step 1

Plot a line for

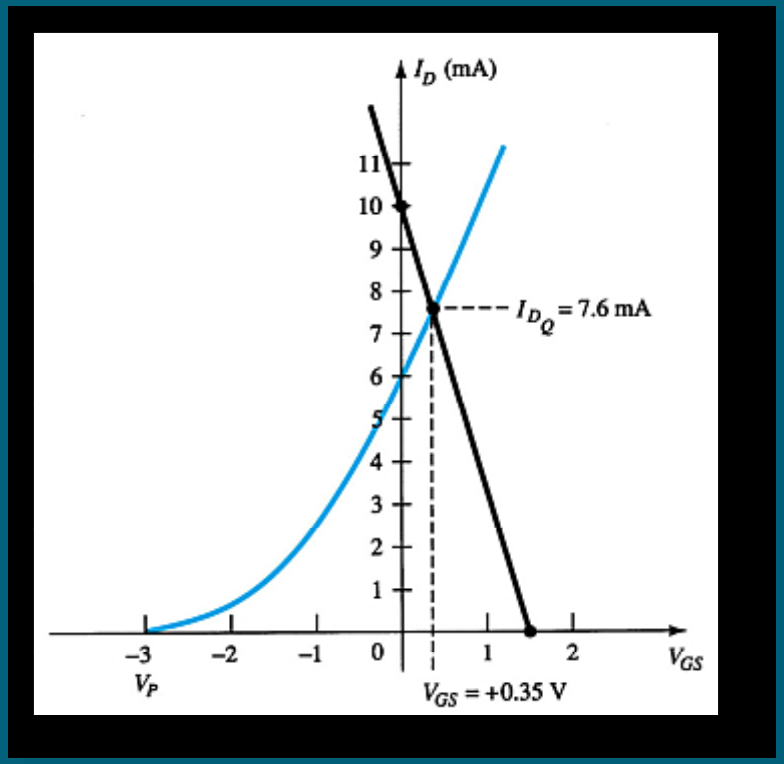
- $V_{GS} = V_G$, $I_D = 0$
- $I_D = V_G/R_S$, $V_{GS} = 0$

Step 2

Plot the transfer curve by plotting I_{DSS}, V_P and calculated values of I_D

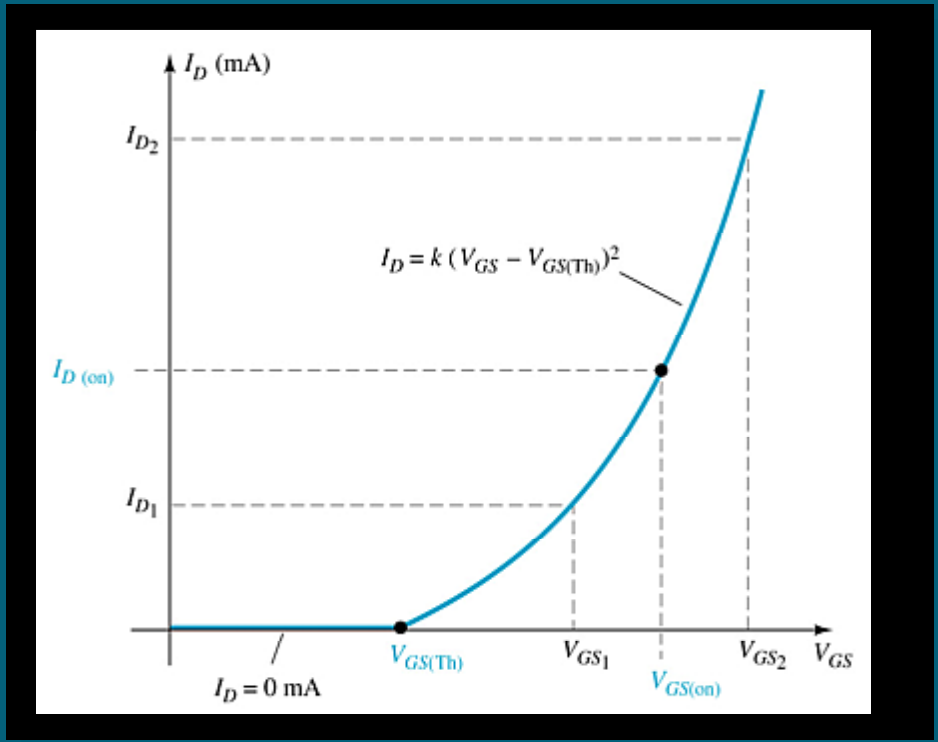
Step 3

The Q-point is located where the line intersects the transfer curve



Enhancement-Type MOSFET

The transfer characteristic for the enhancement-type MOSFET is different from JFET or depletion-type MOSFET.

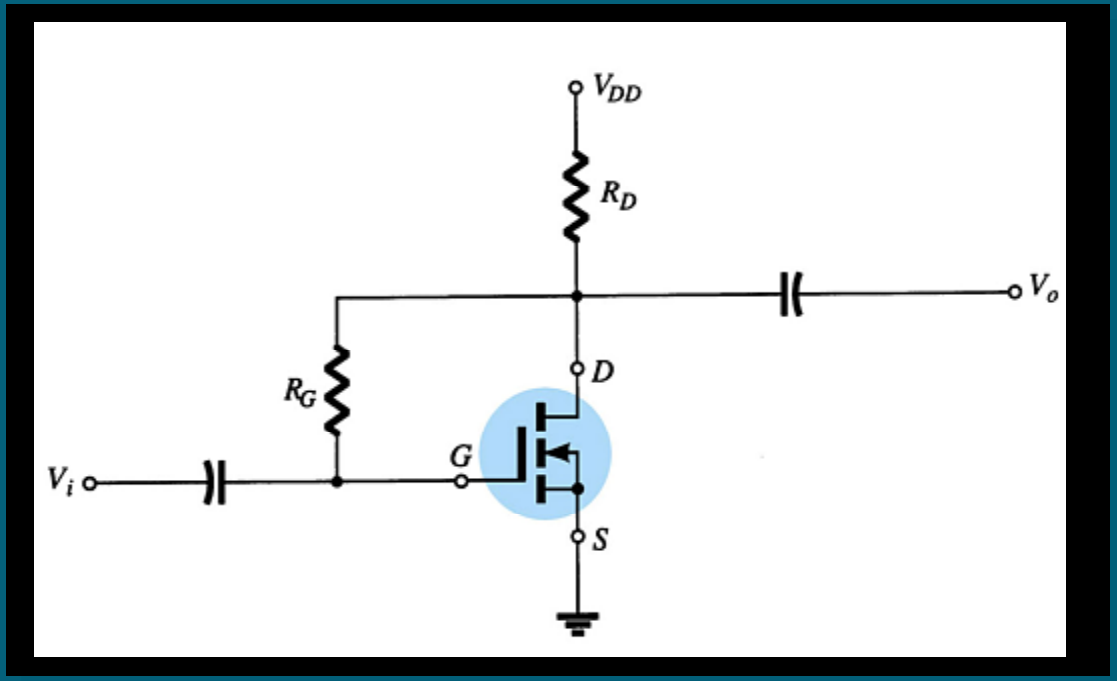


Feedback Biasing

$I_G = 0A, V_{RG} = 0V$

So $V_{DS} = V_{GS}$

And $V_{GS} = V_{DD} - I_D R_D$



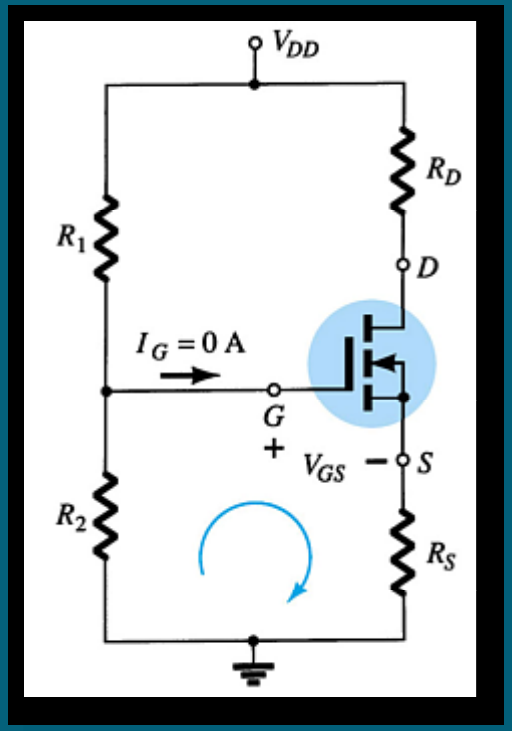
Voltage-Divider Biasing

Plot the line and the transfer curve to find the Q-point. The equations are:

$$V_G = \frac{R_2 V_{DD}}{R_1 + R_2}$$

$$V_{GS} = V_G - I_D R_S$$

$$V_{DS} = V_{DD} - I_D(R_S + R_D)$$



p-Channel FETs

***p*-channel FETs use the same calculations and graphs with *n*-channel, except that the voltage polarities and current directions are the opposite.**