Metal oxide Semiconductor Field effect transistor: Basic structure, working of p channel MOSFET Depletion type and study of output and transfer characteristics.

Reference: Boylestad, "Electronic devices and Circuit theory"

METAL OXIDE SEMICONDUCTOR FIELD-EFFECT TRANSISTORS

p-Channel Depletion-Type MOSFET

The construction of a *p*-channel depletion-type MOSFET is exactly the reverse of that appearing in Fig. 6.27. That is, there is now an *n*-type substrate and a *p*-type channel, as shown in Fig. 6.32a. The terminals remain as identified, but all the voltage polarities and the current directions are reversed, as shown in the same figure. The drain characteristics would appear exactly as in Fig. 6.29, but with V_{DS} having negative values, I_D having positive values as indicated (since the defined direction is now reversed), and V_{GS} having the opposite polarities as shown in Fig. 6.32c. The reversal in V_{GS} will result in a mirror image (about the I_D axis) for the transfer characteristics as shown in Fig. 6.32b. In other words,

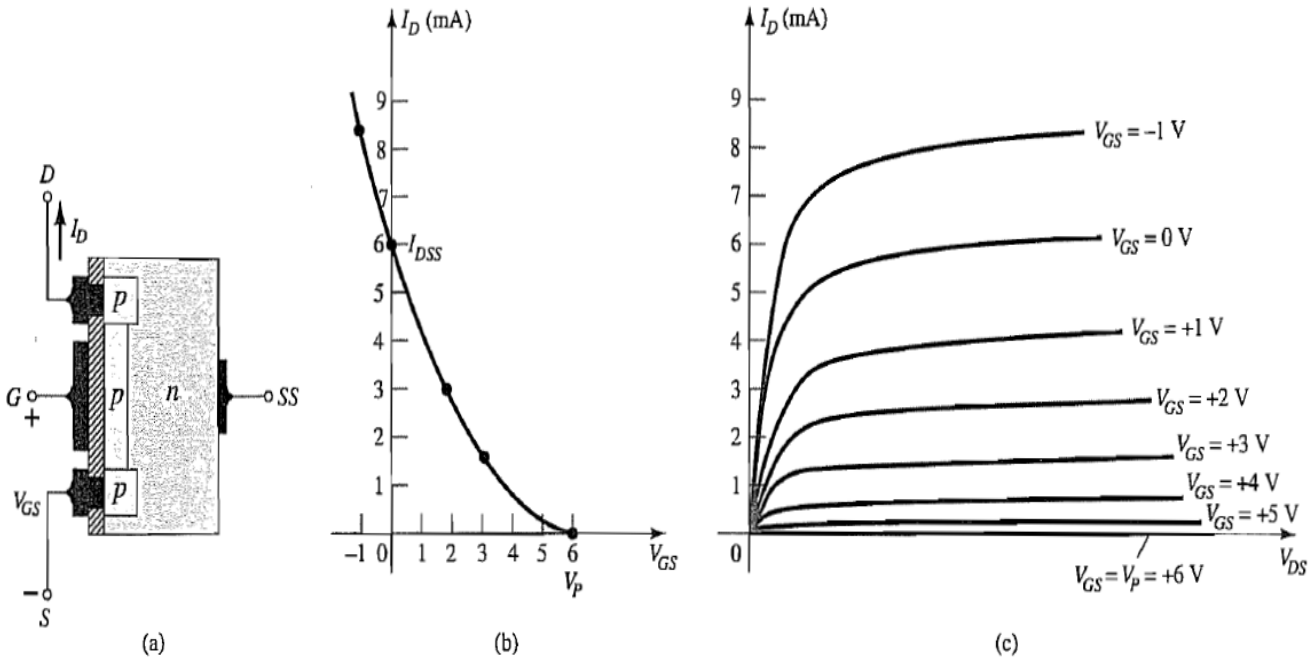

FIG. 6.32
p-Channel depletion-type MOSFET with I_{DSS} = 6 mA and V_P = +6 V.

the drain current will increase from cutoff at $V_{GS} = V_P$ in the positive V_{GS} region to I_{DSS} and then continue to increase for increasingly negative values of V_{GS}. Shockley's equation is still applicable and requires simply placing the correct sign for both V_{GS} and V_P in the equation.