

H# 4.3 ; problems.pdf 55-58, 71b

- 55 a) A "small" - forward biased diode
 B "small" - channel = resistor of n-type material
 b) A "large" - back biased diode
 B "small" - NO change

56 $I_{DSS} \approx 12.4 \text{ mA}$ $V_{GS,off} \approx -3 \text{ V}$

@ Q $I_D \approx 6 \text{ mA}$ $V_{DS} \approx 7.5 \text{ V}$ $V_{GS} = -1 \text{ V}$

gain = $\frac{\Delta V_{out}}{\Delta V_{in}} = -6$

$V_{GS} = -1 \text{ V}$ $\begin{cases} \uparrow 1.5 \Rightarrow 4.3, 8.5 \text{ mA} \\ \downarrow 1.5 \Rightarrow 10.3, 4 \text{ mA} \end{cases}$

\uparrow \uparrow

$A_{V_{in}} = 1 \text{ V}$ $A_{V_{out}} = 6 \text{ V}$

PP

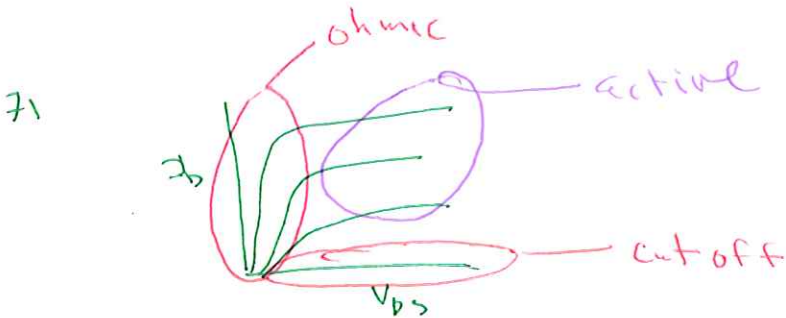
57 $I_{DSS} = 12.4 \text{ mA} \Rightarrow V_{out} = 25 \text{ k}\Omega (12.4 \text{ mA}) = 12.6 \text{ V}$

58 $G = 1 + \frac{R_1}{R_{FET}}$

$V_{GS} = 0 \rightarrow R_{FET} = 670 \Omega$ $G = 150$

$-1.5 \rightarrow$ $= 1.33 \Omega$ $G = 76$

@ $100 \text{ k}\Omega \rightarrow 1 + \frac{100 \text{ k}}{67}$ $G = 1493$



4.3

$V_- = \frac{R_1 (V_o - V_{in})}{(R_1 + R_4)} + V_{in}$

" " \downarrow cancel

$V_+ = \frac{R_2 V_o - (R_2 || R_3) I}{R_2 + R_3}$

$-\frac{R_1}{(R_1 + R_4)} V_{in} + V_{in} = \frac{R_4}{R_2 + R_3} V_{in} = -\frac{(R_2 || R_3) I}{(R_2 + R_3)}$

cancel

$V_{in} = -R_2 I$ ✓

Note: $\frac{R_4}{R_1 + R_4} = \frac{R_3}{R_2 + R_3}$

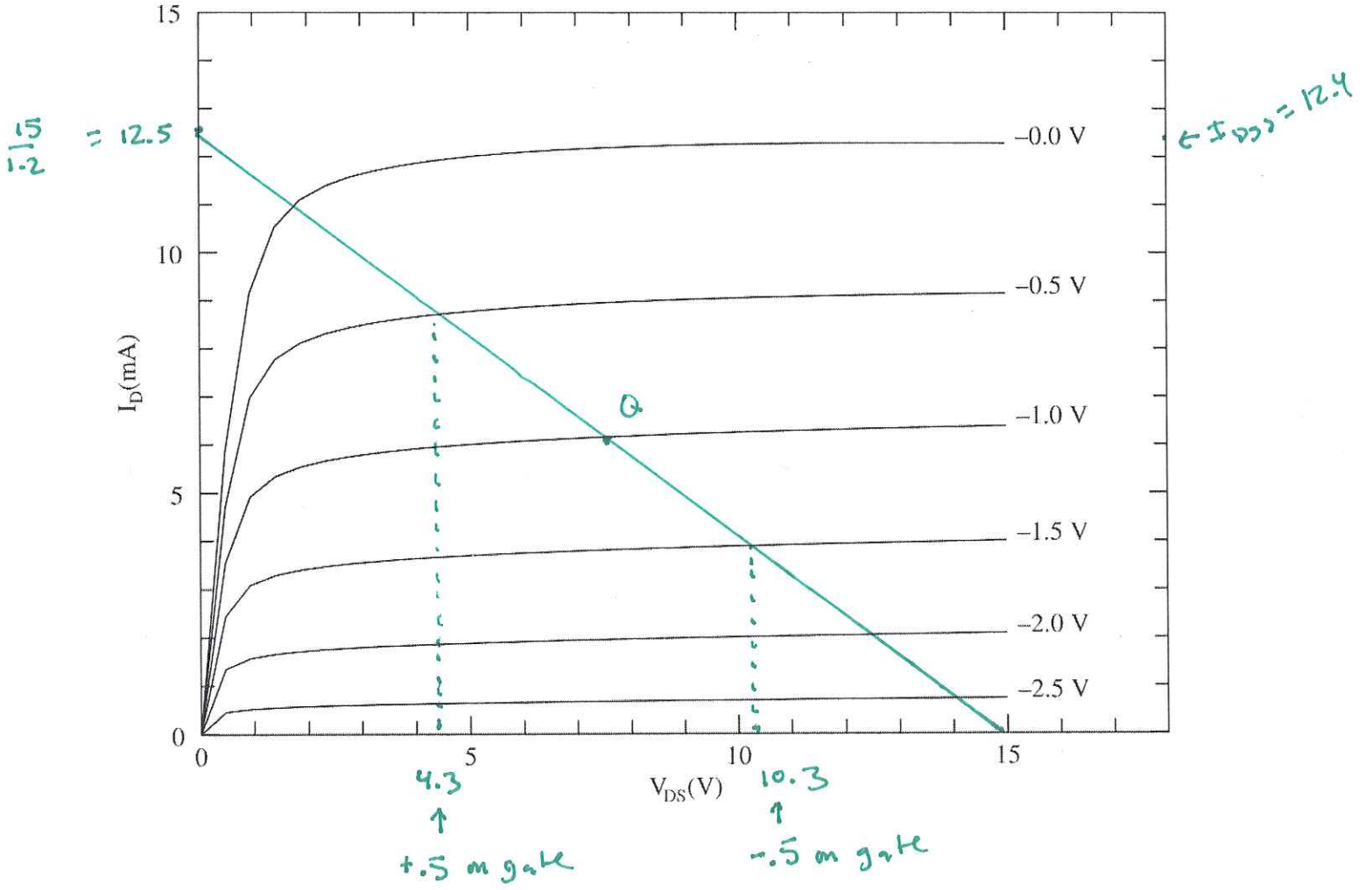
\uparrow

Note: $\frac{R_3}{R_2} = \frac{R_4}{R_1}$

\downarrow

$\frac{R_1}{R_1 + R_4} = \frac{R_2}{R_2 + R_3}$

Characteristic Curves for nFET



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