

TYU 3.12 The circuit shown in Figure 3.45 is biased at $V_{DD} = 10\text{ V}$, and the transistor parameters are $V_{TN} = 0.7\text{ V}$ and $K_n = 4\text{ mA/V}^2$. Design the value of R_D such that the output voltage will be $v_O = 0.20\text{ V}$ when $v_I = 10\text{ V}$. (Ans. $0.666\text{ k}\Omega$)

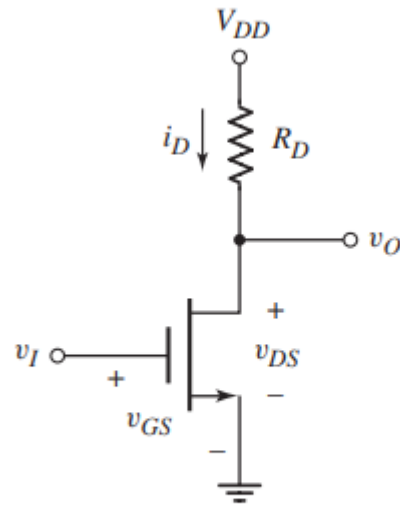
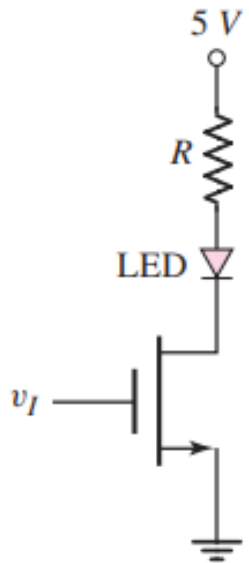


Figure 3.45 NMOS inverter circuit

1. The transistor in the circuit shown in Figure has parameters $K_n = 4 \text{ mA/V}^2$ and $V_{TN} = 0.6\text{V}$, and is used to switch the LED on and off. The LED cut-in voltage is $V_\gamma = 1.2\text{V}$. The LED is turned on by applying an input voltage of $V_I = 5\text{V}$. $R = 1.2\text{k}$. Determine I_D and V_{DS} .
2. The transistor in the circuit shown in Figure has parameters $K_n = 3 \text{ mA/V}^2$ and $V_{TN} = 0.6\text{V}$, and is used to switch the LED on and off. The LED cut-in voltage is $V_\gamma = 1.6\text{V}$. The LED is turned on by applying an input voltage of $V_I = 5\text{V}$. Design R such that $V_{DS} = 0.15\text{V}$ for $V_I = 5\text{V}$. Determine I_D .



1. The transistor in the circuit shown in Figure has parameters $K_P = 3 \text{ mA/V}^2$ and $V_{TP} = -0.6 \text{ V}$, and is used to switch the LED on and off. The LED cutin voltage is $V_\gamma = 1.2 \text{ V}$. The LED is turned on by applying an input voltage of $V_I = 0 \text{ V}$. Design R_D such that $V_{DS} = -0.12 \text{ V}$ for $V_I = 0 \text{ V}$. Determine I_D .

