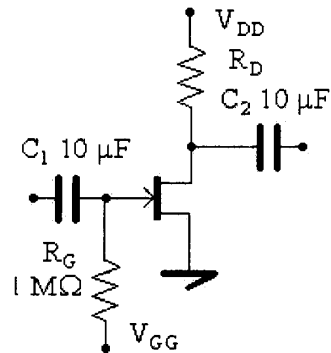


Baskent University, Faculty of Engineering
BME 222-02 – Electronics (Spring Semester 2004/2005)
Quiz 3 – May 20, 2005

Student Name _____

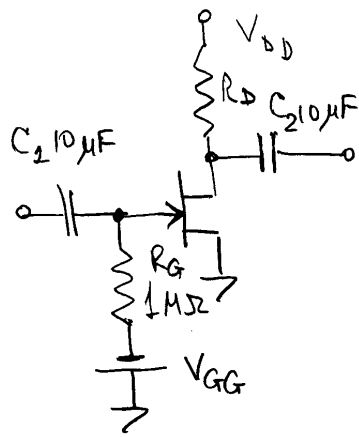
Faculty No: _____



For the network of Figure determine V_{DSQ} , V_{GG} and R_D . Given the information $V_P = -8\text{ V}$, $I_{DSS} = 16\text{ mA}$, $I_{DQ} = 4\text{ mA}$, $V_{DD} = 12\text{ V}$ and $V_D = 6\text{ V}$.

5 points.

Good Luck!



For the network of Figure determine V_{DS} , V_{GS} , R_D . Given the information $V_p = -8V$, $I_{DSS} = 16mA$ and $I_{DQ} = 4mA$, $V_{DD} = 12V$, $V_D = 6V$

Solution :

1. Using parameters listed above, the gate-to-source voltage can be defined from Shockley equation

$$I_{DQ} = I_{DSS} \left(1 - \frac{V_{GS}}{V_p}\right)^2$$

$$\left(1 - \frac{V_{GS}}{V_p}\right)^2 = \frac{I_{DQ}}{I_{DSS}}$$

$$1 - \frac{V_{GS}}{V_p} = \sqrt{\frac{I_{DQ}}{I_{DSS}}}$$

$$\underline{V_{GS} = V_p \left(1 - \sqrt{\frac{I_{DQ}}{I_{DSS}}}\right) = -8 \left(1 - \sqrt{\frac{4 \cdot 10^{-3}}{16 \cdot 10^{-3}}}\right) = -8 \left(1 - \frac{1}{2}\right) = -4V}$$

$$\text{And from this } \underline{V_{GG} = +V_{GS} = -4V}$$

2. Drain resistor can be defined from equation

$$V_{DS} = V_{DD} - I_D R_D$$

Because $\underline{V_{DS} = V_D = 6V}$, resistance of R_D is

$$\underline{R_D = \frac{V_{DD} - V_{DS}}{I_D} = \frac{12 - 6}{4 \cdot 10^{-3}} = 1.5 k\Omega}$$