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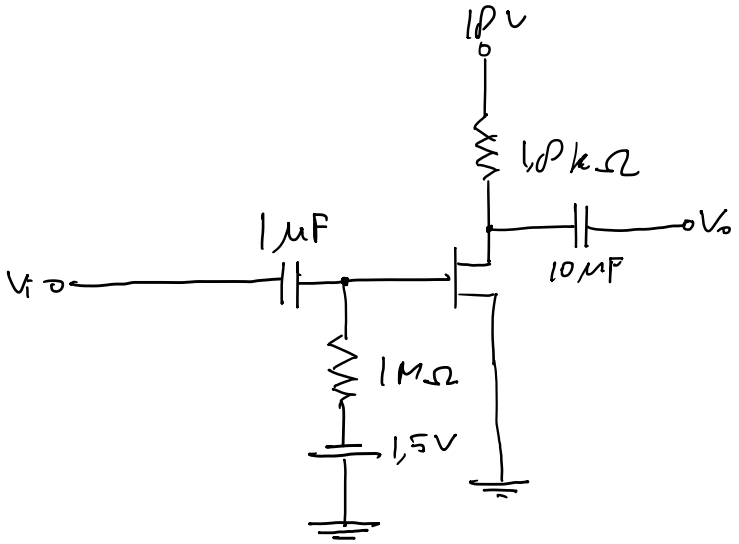
1.



$I_{DSS} = 10\ mA$

$V_p = -6\ V$

$r_d = 40\ k\Omega$

a. $V_{GS} = -V_{GG} = -1,5\ V$

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

$I_{D_Q} = 10\ mA\left(1 - \frac{-1,5}{-6}\right)^2$

$I_{D_Q} = 10\left(1 - \frac{1}{4}\right)^2$

$I_{D_Q} = 5,625\ mA$

$V_{GS_Q} = -V_{GG} = -1,5\ V$

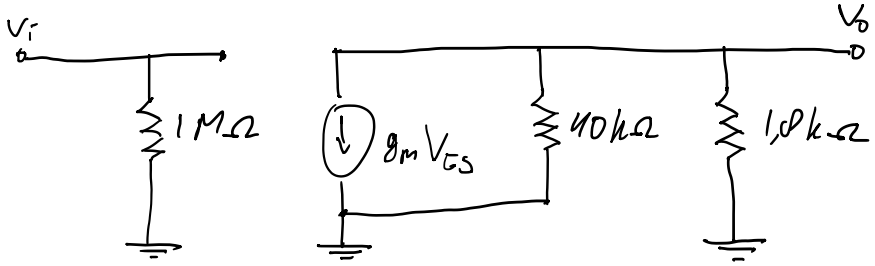
$V_{DS} = V_{DD} - I_{D_Q} R_D$

$V_{DS} = 18 - 5,625\ mA \cdot 1,8\ k\Omega$

$V_{DS} = 18 - 10,125$

$V_{DS} = 7,875\ V$

b.



c. $Z_i = R_G = 1\ M\Omega$

$Z_o = r_d \parallel R_D$

$= 40\ k\Omega \parallel 1,8\ k\Omega$

$= 1722,48\ \Omega$

$g_{mo} = \frac{2I_{DSS}}{|V_p|} = \frac{2 \cdot 10\ mA}{6} = \frac{10}{3}\ mS$

$g_m = g_{mo}\left(1 - \frac{V_{GS}}{V_p}\right) = \frac{10}{3}\left(1 - \frac{-1,5}{-6}\right)$

$g_m = 2,5\ mS$

$A_v = -g_m (r_d \parallel R_D)$

$A_v = -2,5\ mS\ (1722,48)$

$A_v = -4,31$

d.

$$f_{L_G} = \frac{1}{2\pi (R_{sig} + R_i) C_G} = \frac{1}{2\pi (0 + R_G) C_G}$$

$$= \frac{1}{2\pi (1\,k\Omega)\, 1\,\mu F}$$

$$= 0{,}16\ Hz$$

$$f_{L_C} = \frac{1}{2\pi (R_o + R_L) C_C} = \frac{1}{2\pi \left[R_D \| r_d + 0\right) C_C}$$

$$= \frac{1}{2\pi (1722{,}4\,\Omega)\, 10\,\mu F}$$

$$= 9{,}24\ Hz$$

$$R_{eq} = R_S \| \frac{1}{g_m} = 0 \| \frac{1}{g_m} = 0$$

$$f_{L_S} = \frac{1}{2\pi R_{eq} C_S} = \infty$$