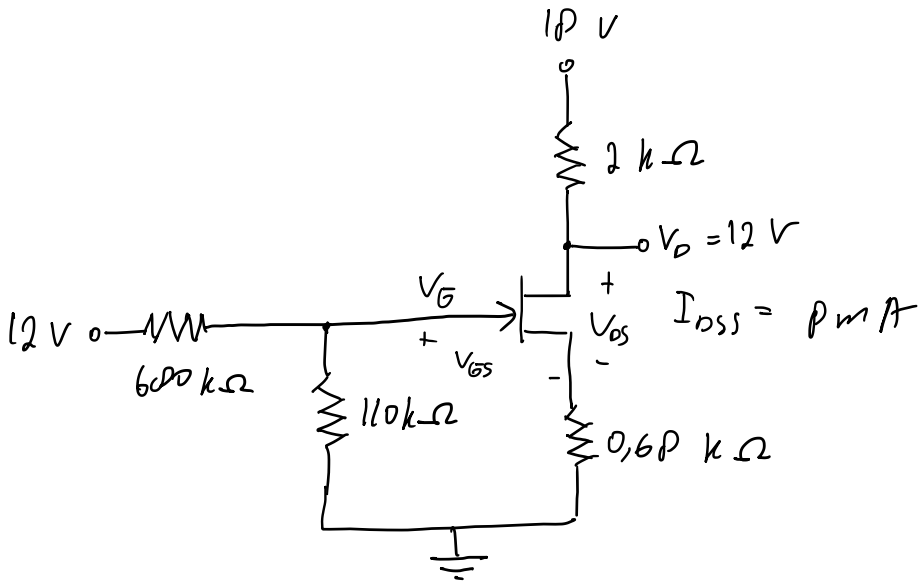
M. Hasyim Abdillah P. 1101191095 TT-43-11

2.



a. $V_D = V_{DD} - I_D R_D$

$12 = 18 - I_D \cdot 2\,k\Omega$

$I_D = \frac{6}{2000} = 3\ mA$

b. $V_S = I_D R_S$

$V_S = 3mA \cdot 0,68\ k\Omega$

$V_S = 2,04\ V$

$V_{DS} = V_D - V_S$

$V_{DS} = 12 - 2,04$

$V_{DS} = 9,96\ V$

c. $V_G = \frac{110\,k\Omega}{680k\Omega + 110k\Omega} \cdot 12$

$V_G = \frac{110}{790} \cdot 12$

$V_G = 1,67\ V$

$V_{GS} = V_G - V_S = 1,67 - 2,04 = -0,37\ V$

d. $I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2$

$3mA = 8mA\left(1 - \frac{-0,37}{V_P}\right)^2$

$3 = 8\left(\frac{V_P + 0,37}{V_P}\right)^2$

$3 = 8 \cdot \frac{(V_P + 0,37)^2}{V_P^2}$

$3V_P^2 = 8V_P^2 + 5,92\,V_P + 1,09552$

$5V_P^2 + 5,92V_P + 1,09552 = 0$

$V_{P1} = -0,95\ V$

$V_{P2} = -0,23\ V$

Syarat: $V_P \leq V_{GS} = V_P \leq -0,37$

$\therefore V_P = V_{P1} = -0,95\ V$