3-3

① $U_{GS} > U_{GS(off)}$

$U_{GD} = -4V > U_{GS(off)}$

故为可变电阻区

② $U_{GS} > U_{GS(off)}$

$U_{GD} = +6V < U_{GS(off)}$

故为恒流区

③ $U_{GS} > U_{GS(off)}$

$U_{GD} = -9V > U_{GS(off)}$

故为可变电阻区

④ $U_{GS} < U_{GS(off)}$

故为夹断区

3-9

a) 不能

b) 此为耗尽型N型场效应管，$U_{GS}$为任何值 $U_{DD}$

c) 可以正常放大

d) 不能

3-7

解：1) $I_D = I_{DSS}\left(1 - \frac{U_{GS}}{U_{GS(off)}}\right)^2 = 0.5mA$

$$R_{S1} \approx \frac{U_{GS}}{I_D} = \frac{2V}{0.5mA} = 4k\Omega$$

2) 为使电路处于正常放大状态。

$U_{GS} > U_{GS(off)} = -4V$

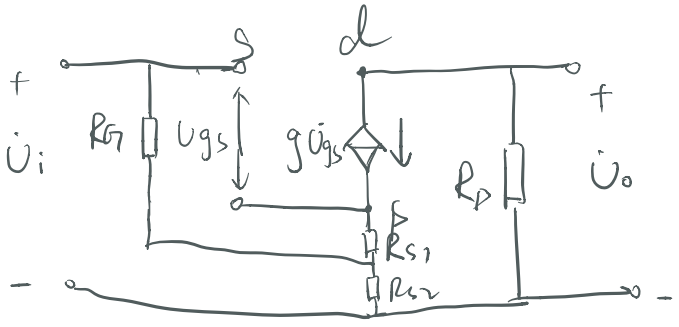
$U_{GD} < U_{GS(off)} = -4V$

$U_{GD} = U_{GS} - U_{DS}$

$U_{DS} = V_{DD} - I_D(R_D + R_{S1} + R_{S2})$

$\Rightarrow R_{S2max} = 22k\Omega$

3)



$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{g\dot{U}_{gs}R_D}{\dot{U}_{gs} + g\dot{U}_{gs}(R_{S1}+R_{S2})}$$

$$g = \frac{-2I_{DSS}}{U_{GS(off)}}\left(1 - \frac{U_{GS}}{U_{GS(off)}}\right) = \frac{-2\times 2mA}{-4V} \times \frac{1}{2}$$

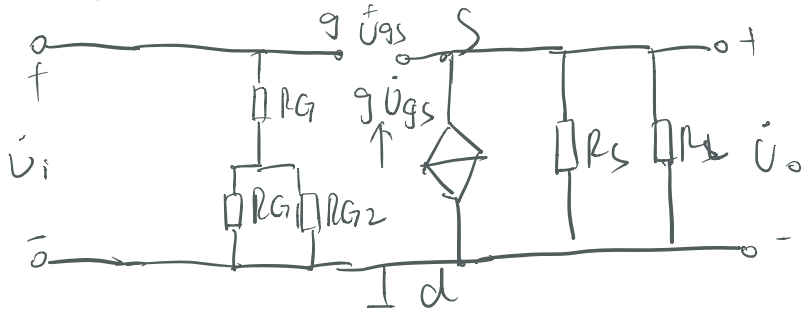
$$= \frac{1}{2}\times 10^{-3}$$

代入得

$$= \frac{\frac{1}{2}\times 10^{-3} \times 10k}{1 + \frac{1}{2}\times 10^{-3}\times(10k + 22k)}$$

$$= \frac{5}{16}$$

3-11




$$\dot{U}_o = g_m\dot{U}_{gs}(R_S // R_L)$$

$$\dot{U}_i = \dot{U}_{gs} + g_m\dot{U}_{gs}(R_S // R_L)$$

$$\therefore A_v = \frac{g_m(R_S \| R_L)}{1 + g_m(R_S \| R_L)} = \frac{12 \times 1}{1 + 12 \times 1} = \frac{12}{13}$$

$$R_i = R_G + R_{G1} \| R_{G2} \approx 2\,M\Omega$$

$$R_o = R_S \| \frac{1}{g_m} = \frac{12}{13}\,k\Omega$$