Student information:

832002117

20122161

Hanlin Cai

Q1

C A B D D

Q2

(1)

Let the MOSFET work in the triode region, then it has the same function as this resistor.

Advantages: ①simple manufacturing process, which can save costs ②it owns high input impedance

(2)

Operation principle: the control circuit to control the operation of the whole system, the inverter circuit to complete the conversion from direct current to alternating current function, the filter circuit is used to filter out unwanted signals.

Why: DC voltage drop is small, which lowers the operating supply voltage, while its equivalent dynamic resistance is large. Besides, MOSFETs can reduce power consumption.

Q3

(a)neither (b)enhancement (c)neither (d)depletion

Q4

Tutor 2

Q.4.

sol.

$V_{GS} = |V_G - V_S| = 5V$

$V_T = 1.5V$

(1) when $V_D = 4V$

$|V_{DS}| = |V_D - V_S| = 1V$

$\because V_{DS} < V_{GS} - V_T$

$\therefore I_{D1} = \mu_p C_{ox}(W/L)[(|V_{GS}| - |V_T|) \cdot$

$\cdot |V_{DS}| - \frac{1}{2}|V_{DS}|^2]$

$\therefore I_D = 80 \times 10^{-6} \times (3.5 - 0.5)$

$= 240 \mu A$

(2) when $V_D = 1.5V$

$|V_{DS}| = 3.5V = |V_{GS}| - |V_T|$

$\therefore I_{D2} = 0.5 \times 80 \times 10^{-6} \times 3.5^2$

$= 490 \mu A$

$(I_{D2} = \frac{1}{2}\mu_p C_{ox}(W/L)[V_{GS} - V_T]^2)$

(3) when $V_D = 0V$

$V_{DS} = 5V = V_{GS}$

$I_{D3} = I_{D2} = 490 \mu A$

(4) when $V_D = -5V$

$V_{DS} = 10V > |V_{GS}|$

$I_D = \frac{1}{2}\mu_p C_{ox}(W/L)(V_{GS} - V_T)^2(1 + \lambda V_{DS})$

$= \frac{1}{2} \times 80 \times 10^{-6} \times 3.5^2 \times 1.2$

$= 588 \mu A$

So (1) $240 \mu A$

(2) $490 \mu A$

(3) $490 \mu A$

(4) $588 \mu A$

Q5

Q5.

sol By the Q.

Because $V_D = V_G$ $V_T > 0$

$\therefore |V_{DS}| > |V_{GS}| - |V_T|$

So the MOS works in the saturation region.

$I_D = \frac{1}{2}\mu_n C_{ox}[V_{GS} - V_T]^2$ ①

$V_{DS} = V_{DD} - I_D R$ ②

$\therefore V_{DS} = 4.8V$

That’s all, thank you!
832002117
Hanlin Cai