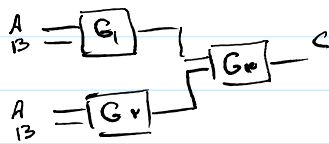


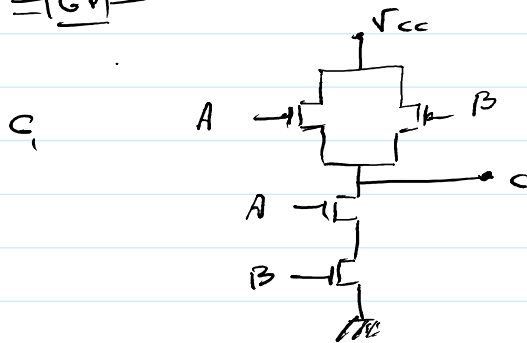
سطح مختلف برای :
 ۱- برای در سطح سیستم
 ۲- برای در سطح گیت
 در درس جاری

۳- برای در سطح ترانزیستور
 در درس الکترونیک دیجیتال



در درس VLSI

۴- برای در سطح VLSI



نمونه اعداد

Number systems

	decimal	binary	octal	hex
radix	10	2	8	16
digit	0-9	0,1	0-7	0-15

$(721)_8$

$(721)_{10}$

0-9

10 → A

11 → B

12 → C

13 → D

14 → E

15 → F

$$(129)_{10} = 1 \times 10^2 + 2 \times 10^1 + 9 \times 10^0$$

$$(1011)_2 = 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = (11)_{10}$$

$$(N)_{10} = (a_n a_{n-1} \dots a_0 / a_{-1} a_{-2} \dots a_{-m})_r = \sum_{i=-m}^n a_i r^i$$

$$(N)_{10} = \left(\overset{\text{r}^{n-1}}{a_n} \overset{\text{r}^0}{a_{n-1}} \dots \overset{\text{r}^{-1}}{a_0} / \overset{\text{r}^{-1}}{a_{-1}} \overset{\text{r}^{-2}}{a_{-2}} \dots \overset{\text{r}^{-m}}{a_{-m}} \right)_r = \sum_{i=-m}^n a_i r^i$$

$$\left(\overset{\text{r}^2}{11} \overset{\text{r}^0}{00} / \overset{\text{r}^{-1}}{11} \right)_r = \underbrace{1 \times r^2 + 1 \times r^2 + 1 \times r^0 + 1 \times r^{-1} + 1 \times r^{-2}}_{\text{r}^2 + \text{r}^2 + 1 + \text{r}^{-1} + \text{r}^{-2}} = (r\Delta, v\Delta)_{10}$$

$$\left(\overset{\text{r}^1}{w1} / \overset{\text{r}^{-1}}{q} \right)_\Lambda = \underbrace{w \times \Lambda^1 + 1 \times \Lambda^0}_{\text{r}^1 + \text{r}^0} + \underbrace{q \times \Lambda^{-1}}_{\text{r}^{-1}} = (r\Delta, v\Delta)_{10}$$

$$(IV)_\Lambda = (F)_{19} = (1111)_r = (1\Delta)_{10}$$

$$(r\Delta)_\Lambda = (10)_{19} = (10000)_r = (19)_{10}$$

$$(AB)_{19} = 1 \times 19^1 + 11 \times 19^0 = (1VI)_{10}$$

(1211)₁₉

$$10 \xrightarrow{r} r$$

$$(r.)_{10} = (\quad ? \quad)_r$$

$\begin{matrix} 10 & 10000 \\ \swarrow & \searrow \\ r\Delta & r^4 \end{matrix}$

$$\begin{matrix} r. & r. & r. & r. & r. \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 0 & 0 & 0 & 1 & 0 \end{matrix}$$

$$(9.)_{10} = (\Delta 0)_\Lambda$$

$$\begin{matrix} r. & r. \\ \downarrow & \downarrow \\ 0 & \Delta \end{matrix}$$

$$(r\Delta r)_{10} \approx (?)_r$$

$\begin{matrix} 0 & 10000 & 1 \\ \swarrow & \searrow & \searrow \\ r^{-1} & r^{-2} & r^{-3} \end{matrix}$

$$1 \times r^{-1} + 1 \times r^{-2} = (2r)_{10}$$

$$\begin{aligned} r\Delta r \times r &= 1 \times r^2 \rightarrow 1 \\ r\Delta r \times r &= r \times \Lambda \rightarrow 0 \\ r\Delta r \times r &= r \times 19 \rightarrow 0 \\ r\Delta r \times r &= r \times r \rightarrow 0 \\ r\Delta r \times r &= r \times r \rightarrow 0 \\ r\Delta r \times r &= r \times \Lambda \rightarrow 1 \\ r\Delta r \times r &= r \times \Lambda \rightarrow 1 \end{aligned}$$

$$(11, 70)_{10} = (\overset{1011/11}{?})_2$$

$$(11)_{10} = (1011)_2 \longrightarrow \begin{array}{r} 11 \\ \underline{10} \quad 1 \\ \quad \underline{1} \quad 1 \\ \quad \quad \underline{1} \quad 1 \\ \quad \quad \quad \underline{1} \end{array}$$

$$(-70)_{10} = (-1011000)_{10}$$

$$\begin{aligned} 70 \times 2 &\longrightarrow 140 \longrightarrow 1 \\ 35 \times 2 &\longrightarrow 70 \longrightarrow 1 \\ 17 \times 2 &\longrightarrow 34 \longrightarrow 0 \\ 8 \times 2 &\longrightarrow 16 \longrightarrow 0 \\ 4 \times 2 &\longrightarrow 8 \longrightarrow 0 \\ 2 \times 2 &\longrightarrow 4 \longrightarrow 0 \\ 1 \times 2 &\longrightarrow 2 \longrightarrow 1 \end{aligned}$$

$$(14, 4)_{10} = (1011100)_{10}$$

$$(17, 444)_{10} \xrightarrow{4 \times 4^{-1}} (1011100)_{10}$$

$$(17)_{10} = (1011100)_{10}$$

$$\begin{aligned} 444 \times 11 &= 4884 \longrightarrow 4 \\ 322 \times 11 &= 3542 \longrightarrow 3 \\ 289 \times 11 &= 3179 \longrightarrow 2 \end{aligned}$$

$$(444)_{10} = (1011100)_{10}$$

$$\left(\frac{1011}{1} \frac{1011}{4} \frac{1011}{9} \right)_2 = (149, 29)_8$$

$$10110011010110$$

$$(127)_8 = (1011010111)_2$$

تبدیل از منبای ۸ به ۲

تبدیل منبای ۲ به ۱۶

$$(AC, 14F)_{16} = (10101100 / 11101111)_{16}$$

$$(AC, IVF)_{19} = \left(\frac{1010}{A} \frac{1100}{C} / \frac{0001}{1} \frac{0111}{V} \frac{1111}{F} \right)_2$$

$$A^K = B \quad , \quad B \text{ به مبنای } A \text{ به مبنای } K$$

$$(1230112, 2310)_6 = \left(\frac{1}{19} \right)$$

محل به عدد شده

محاسبات :

$$\begin{array}{r} 11101 \\ + 111101 \\ \hline 1011010 \end{array}$$

$$(10)_2 = (2)_{10}$$

$$\begin{array}{r} 10110101 \\ + 10110101 \\ + 11010101 \\ + 00110101 \\ \hline 100000000 \end{array}$$

$$E \rightarrow 10$$

$$2 \rightarrow 10$$

$$\begin{array}{r} 1111 \\ (AB.89)_{14} \\ + (89FCE)_{14} \\ \hline (10202V)_{14} \end{array}$$

A	10
B	11
C	12
D	13
E	14
F	15

23	$(1V)_{14}$
18	$(12)_{14}$
19	$(10)_{14}$

$$\begin{array}{r} 011110 \\ \times \times \times \times \times \times \\ \hline 00001 \end{array} \rightarrow 31$$

$$N = 1100100 \xrightarrow{2 \text{ مسم } (2'c)} 0011100$$

$$\begin{array}{r} 011112 \\ \times \times \times \times \times \times \\ \hline 110000 \end{array}$$

