

رقم	BCD
0	0000
1	0001
2	0010
3	.
4	.
5	.
6	.
7	.
8	1000
9	1001

$$\begin{array}{r}
 42.7 \\
 \begin{array}{cccc}
 & & & \\
 & & & \\
 & & & \\
 & & &
 \end{array} \\
 0100 \ 0010 \ . \ 0111 \\
 + 0000 \ 0110 \ . \ 0101 \\
 \hline
 1100 \\
 0110 \\
 \hline
 0100 \ 1001 \ 0010
 \end{array}$$

49.2

$$\begin{array}{r}
 \begin{array}{cccc}
 & & & \\
 & & & \\
 & & &
 \end{array} \\
 46 \ 0101110 \quad \text{BCD} \ 0100 \ 0110 \\
 + 18 \ 0010010 \quad + 0001 \ 1000 \\
 \hline
 64 \ 1000000 \quad 0110 \ 1110 \rightarrow E \\
 \quad \quad \quad 0110 \\
 \quad \quad \quad \hline
 \quad \quad \quad 0100
 \end{array}$$

$$14 - 10 = 4$$

$$10 \text{ مقل} = 16 - 10 = 6$$

$$14 + 6 =$$

$$\begin{array}{cc}
 0110 & 0100 \\
 6 & 4
 \end{array}$$

$$\begin{array}{r}
 08 \\
 + 08 \\
 \hline
 16
 \end{array}
 \quad
 \begin{array}{r}
 0000 \ 1000 \\
 + 0000 \ 1000 \\
 \hline
 0000 \ 1000 \\
 + 0010 \\
 \hline
 0001 \ 0110 = 16
 \end{array}$$

16 بائری ← ⑥

تابع 2^{2^n}

متغیر n متغیر چند تابع؟ ^{باینری}

$f_0=0, f_1=1$ متغیر 0

$f_4(a)=\bar{a}$ $f_3(a)=a$ متغیر 1

متغیر 2 تابع

$x \rightarrow f(x)$

$f_0(x)=0$ $f_1(x)=1$ $f_2(x)=x$ $f_3(x)=\bar{x}$

$f(A,B)=$

AB	f_0	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}
00	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
01	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
10	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
11	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

$f_0(A,B)=0$ $f_1=A.B$ (AND)

$A \text{ --- } \text{AND} \text{ --- } B \rightarrow C = A.B$ $A \& B$

$f_2=A.\bar{B}$ ($A \Rightarrow B$)' $f_3(A,B)=A$

$A \& B$
 $A \wedge B$
 AB

buffer : $A \rightarrow A$

$f_4=A'B$ ()

$f_5=B$ $B \rightarrow B$

$f_6=A'B+AB'=A \oplus B$

$A \text{ --- } \text{XOR} \text{ --- } B \rightarrow A \oplus B$

Exclusive OR \perp EXOR \perp XOR

فرد

$$f_7 = A + B \quad \begin{matrix} A \\ B \end{matrix} \rightarrow \text{OR} \rightarrow A + B$$

$$f_8 = \bar{A} \cdot \bar{B} = \overline{A + B} \quad \text{NOR}$$

NOR: NOT OR



$$\begin{matrix} A \\ B \end{matrix} \rightarrow \text{NOR} \rightarrow C = \overline{A + B} \quad \text{NOR}$$

$$= \bar{A} \cdot \bar{B}$$

$$A \rightarrow \text{NOT} \rightarrow \bar{A} \quad \text{NOT = Inverter}$$

مکس کننده



$$f_9 = \bar{A}\bar{B} + AB = (A \oplus B)' \quad \text{XNOR}$$



1 "1"

0 "0"

$$f_{10} = \bar{B} \quad B \rightarrow \text{NOT} \rightarrow \bar{B}$$

$$f_{11} = A + \bar{B} \quad (B \Rightarrow A)$$

$$f_{12} = \bar{A} \quad A \rightarrow \text{NOT} \rightarrow \bar{A}$$

$$f_{13} = \bar{A} + B = \overline{A \cdot \bar{B}} \quad (A \Rightarrow B)$$

$$f_{12}(A, B) = \bar{A}$$

P	Q	$P \Rightarrow Q$
F	F	T
F	T	T
T	F	F
T	T	T

P	Q	Q
0	0	1
0	1	1
1	0	0
1	1	1

$$f_{14} = \bar{A} \cdot B \quad \text{NOT AND}$$

NAND

$$\begin{matrix} A \\ B \end{matrix} \rightarrow \text{NAND} \rightarrow \overline{A \cdot B} = \bar{A} + \bar{B}$$

$$\begin{matrix} A \\ B \end{matrix} \rightarrow \text{NAND} \rightarrow \overline{A \cdot B} = \bar{A} + \bar{B}$$

$$f_{15} = 1$$

$$f(a,b,c) = a\bar{b} + \bar{a}c$$

{AND, OR, NOT} ← (complete) منطق کامل
گیت کامل

{AND, OR} → گیت نیمه
 $f = \bar{A}$

{AND, NOT} ✓

$(\bar{A} \cdot \bar{B})' = A + B$

{OR, NOT}

{NAND} ✓

{NOR} ✓

A	B	$\bar{A} \cdot \bar{B}$
0	0	1
0	1	1
1	0	1
1	1	0

$A \text{ --- } \square \text{ --- } \bar{A} \equiv \text{---} \square \text{ ---}$

$A \text{ --- } \square \text{ --- } \square \text{ --- } \equiv \text{---} \square \text{ ---}$