

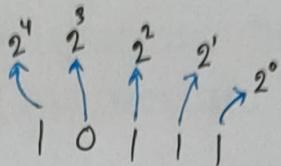
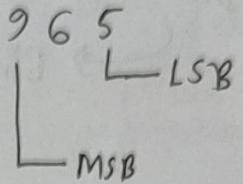
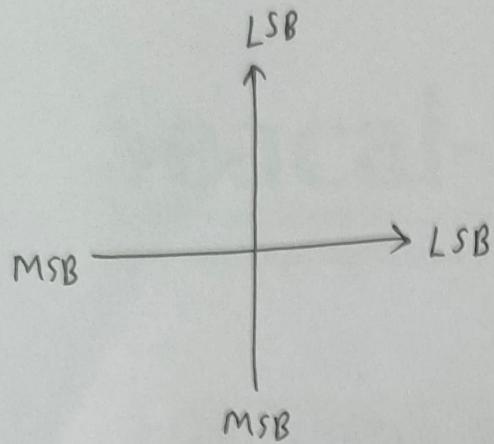
L-1 | 25.01.2023 |

bit → digit
bit → Binary

Seacal-D

**Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)**

Seacal-DX



$$2^{n-1}; \quad n = \text{no of bit}$$

$$\textcircled{*} \quad 41_{10} \rightarrow ?_2$$

$$101001_2 = ?_{10}$$

$$\begin{array}{r} 41 \\ \hline 2 | 20-1 \\ \hline 2 | 10-0 \\ \hline 2 | 5-0 \\ \hline 2 | 2-1 \\ \hline 2 | 1-0 \\ \hline 0-1 \end{array}$$

$$= 101001$$

$$1 \times 2^5 + 0 \times 2^4 + 2^3 \times 1 + 2^2 \times 0 + 0 \times 2^1 + 1 \times 2^0$$

$$= 32 + 8 + 1$$

$$= 41_{10}$$

$$\begin{array}{r}
 1011 \\
 + 1101 \\
 \hline
 11000
 \end{array}
 \quad
 \begin{array}{r}
 \longrightarrow 11 \\
 \longrightarrow + 13 \\
 \hline
 \longrightarrow 24
 \end{array}$$

$$\begin{array}{r}
 1101 \\
 - 1001 \\
 \hline
 0100
 \end{array}
 \quad
 \begin{array}{r}
 \rightarrow 13 \\
 \rightarrow 9 \\
 \hline
 \rightarrow 4
 \end{array}$$

$$\begin{array}{r}
 1101 \\
 - 1010 \\
 \hline
 0011
 \end{array}
 \rightarrow 13 \quad \rightarrow 10 \quad \rightarrow 3$$

$$\begin{array}{r} 0001101 \\ \times 111 \\ \hline \end{array} \quad \begin{array}{r} \longrightarrow 5 \\ \longrightarrow 7 \end{array}$$

$$\begin{array}{r} 11000 \\ \hline 101010 \end{array} \longrightarrow 42$$

$$\begin{array}{r}
 & & 4 \\
 & 1 & 0 & 0 \\
 11) & \overline{1} & 1 & 0 & 0 \\
 & 1 & 1 \\
 & \hline
 & 0 & 0
 \end{array}$$

$$\begin{array}{r}
 & \underline{\quad\quad\quad} \\
 110) & \overline{101010} \xrightarrow{\text{42}}
 \end{array}$$

00
 -
 110
 -
 01001
 -
 110
 -

10110010

$$01001101 \rightarrow 1^{\text{st}} \text{ Complement}$$

+ 1

$01001110 \rightarrow$ 2's Complement

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

realme

Vitamin D₃ (Co-enzyme Q10)
Shot by Legend T JOY

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

L-3 / 01.02.2023 /

$$+39 = 00100111$$

$$-39 = 10100111$$

$$1^{\text{st}} \text{ complement of } -39 = 11011000$$

$$2^{\text{nd}} \text{ complement of } -39 = 11011001$$

a)

$$\begin{array}{r}
 00001000 \longrightarrow 8 \\
 (+) 11111101 \longrightarrow -3 \\
 \hline
 100000101 \longrightarrow 5
 \end{array}$$

Discard Carry Bit

$$\begin{array}{r}
 00001000 \longrightarrow 8 \\
 (-) 00000011 \longrightarrow 3 \\
 \hline
 00000101 \longrightarrow 5
 \end{array}$$

$$\begin{array}{c}
 2^8 = 256 \\
 \downarrow \quad \downarrow \\
 -128 \quad 0 \quad 127 \\
 \downarrow \\
 2^7 = 128 - 1
 \end{array}$$

$$\therefore \text{Range: } -(2^{n-1}) \text{ to } (2^{n-1} - 1)$$

$$32768 \times 32768$$

$$= 1.07 \times 10^9$$

Exponent
Fraction/Mantissa

S \Rightarrow Exponent(E) \Rightarrow Fraction(F)
1 bit 8 bit 23 bit

Number = $(-1)^S (1+F) (2^{E-127})$

Mid Question Must

$$32480 = 1.1111011100000 \times 2^{14}$$

$$E = 14 + 127 = 141_{10} = 10001101_2$$

0	10001101	1111011100000000000000000
1 bit	8 bit	23 bit

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)



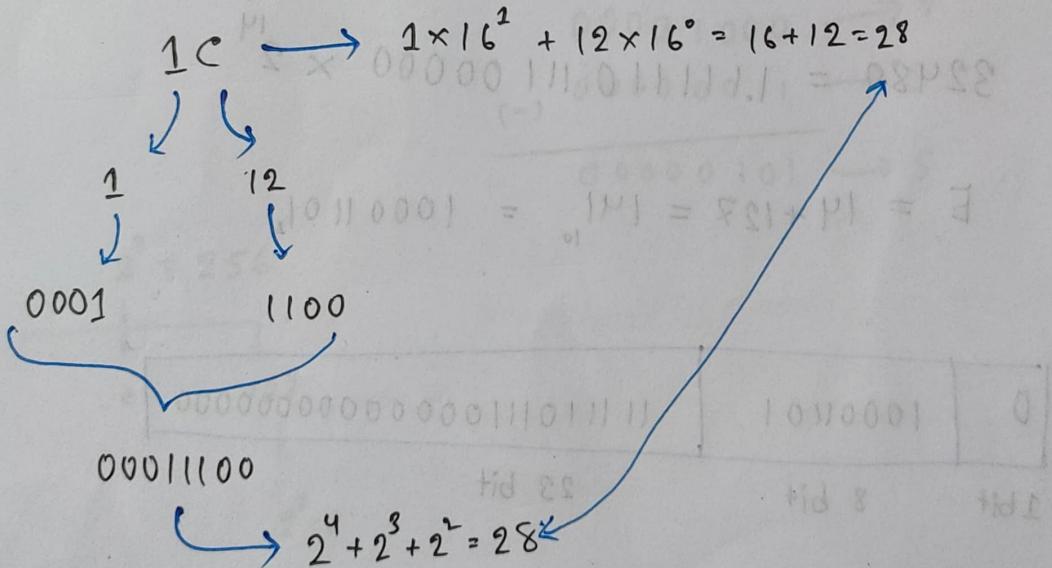
1	10010001	1000110001000000000000
---	----------	------------------------

$$10010001 = 1 + 16 + 128 = 145$$

$$\therefore E = 145$$

$$\therefore \text{Number} = (-1)^{1^2} (1 \cdot 1000110001) (2^{145-127})$$

$$= -110001100010000000$$



L-4 / 06.02.2023 /



$$EF9A = n_{16}$$

$$n_2 = 1110\ 11110011010$$

$$n_8 = 167632$$

$$\begin{aligned}n_{10} &= (14 \times 16^3) + (15 \times 16^2) + (9 \times 16^1) + (10 \times 16^0) \\&= 61338\end{aligned}$$

\Rightarrow

$$\begin{array}{r} 16 \mid 61338 \\ 16 \mid 3833 - 10 \rightarrow A \\ 16 \mid 239 - 9 \rightarrow 9 \\ 16 \mid 14 - 15 \rightarrow F \\ 0 - 14 \rightarrow E \end{array}$$

$$\therefore n_{16} = EF9A$$



$$\begin{array}{c} 19 \\ 10 \xrightarrow{\quad DF \quad} 15 \\ + AC \\ \hline 18 B \end{array} \quad \left| \begin{array}{r} 15 \\ + 12 \\ \hline 27 \\ - 16 \\ \hline 11 = B \end{array} \right. \quad \left| \begin{array}{r} 13 \\ 10 \\ \hline 23 \\ + 1 \\ \hline 24 \\ - 16 \\ \hline 8 \end{array} \right.$$

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

⊗ BCD → Most Important for mid & Quiz

⊗

$$a) 2BD_16 = 2 \times 16^3 + 11 \times 16^2 + 13 \times 16 + 9 \times 1$$

$$= 8192 + 2816 + 208 + 9$$

$$\begin{array}{r} = 11225_{10} \\ 0001 \quad 0001 \quad 0010 \quad 0010 \quad 0101 \Rightarrow BCD \end{array}$$

b)

$$0011 \quad 0011 \rightarrow 33$$

$$\begin{array}{r} \text{Over9} \\ (+) \quad 1001 \quad 0101 \\ \hline 1100 \quad 1000 \end{array} \rightarrow 95$$

$$\begin{array}{r} 110 \\ \hline 0001 \quad 0010 \quad 1000 \\ \hline 1 \quad 2 \quad 8 \end{array} \rightarrow 128$$

⊗

$$0011 \quad 0011 \rightarrow 33$$

$$+ 0101 \quad 1001 \rightarrow 59$$

$$\begin{array}{r} \text{Over9} \\ \hline 1000 \quad 1100 \\ \hline 1001 \quad 0010 \\ \hline 9 \quad 2 \end{array} \rightarrow 72$$

93
89
182

$$\begin{array}{r}
 1001 & 0011 \\
 (+) & 1000 & 1001 \\
 \hline
 0001 & 0001 & \boxed{1100} \\
 & 0110 & 0110 \\
 \hline
 0001 & \cancel{1000} & \cancel{0010} \\
 & 1 & 8 & 2
 \end{array}$$

1001 0001
0001 1001
1000 0100
0110 0110
1110 0001 1000
4 8 1

$$\begin{array}{r}
 1001 & 0001 \\
 0001 & 1001 \\
 1000 & 0100 \\
 0110 & 0110 \\
 \hline
 1110 & 0001 & 1000 \\
 4 & 8 & 1
 \end{array}$$

other signs \leftarrow above \leftarrow not semi-conjugate? ⊗

turn to one

$\oplus =$ net ionidmous to compound of albumin in ⊗



short return ⊗

: minimum number of ⊗

405
 $B+A = X$

X	B	A
5	0	0
1	1	0
1	0	1

Seacal-D
Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX
Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)



$$\begin{array}{r}
 0111 \quad 0101 \longrightarrow 75 \\
 1000 \quad 1001 \longrightarrow 89 \\
 \hline
 1111 \quad 1110 \\
 0110 \quad 0110 \\
 \hline
 0001 \quad 01100100 \\
 \hline
 1 \quad 6 \quad 4
 \end{array}$$



$$\begin{array}{r}
 1000 \quad 1001 \longrightarrow 89 \\
 1001 \quad 1000 \longrightarrow 98 \\
 \hline
 10010 \quad 0001 \\
 00110 \quad 0110 \\
 \hline
 0001 \quad 1000 \quad 0111 \\
 \hline
 1 \quad 8 \quad 7
 \end{array}$$

⊗ Semi-conductor \rightarrow diode \rightarrow Logic Gate

⊗ In Truth Table, number of combination = 2^n

no. of input

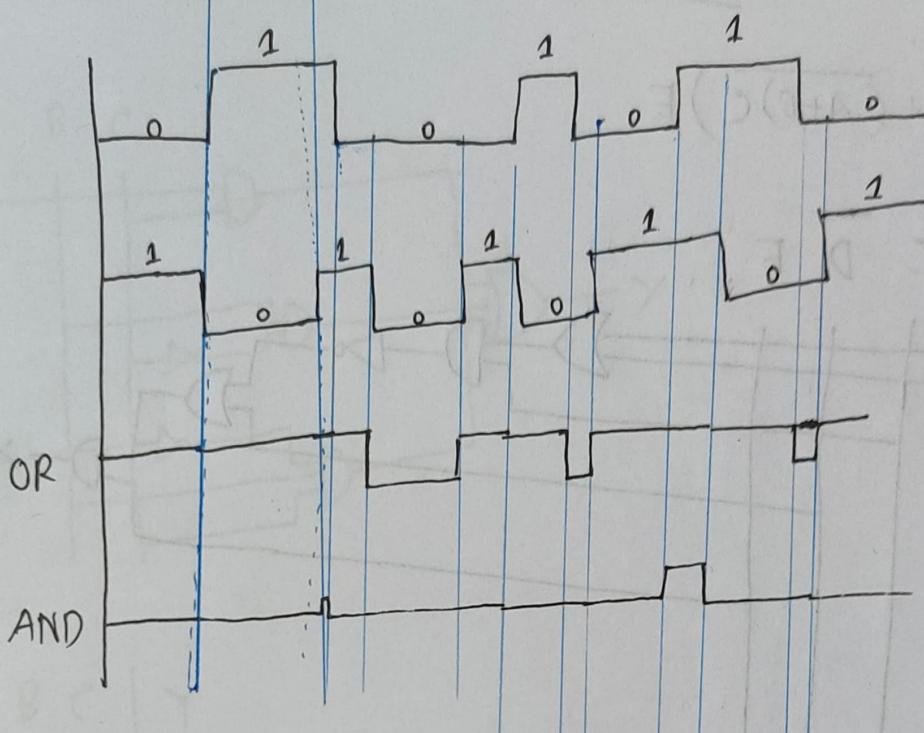


⊗ Boolean Expression:

$$X = A + B$$

⊗ Truth Table

A	B	X
0	0	0
0	1	1
1	0	1
1	1	1



$$30 + 8A = X \quad (\text{total burst})$$

X	3	8	A
0	0	0	0
0	1	0	0
1	0	1	0
1	1	1	0
0	0	0	1
0	1	0	1
0	0	1	1
0	0	1	1

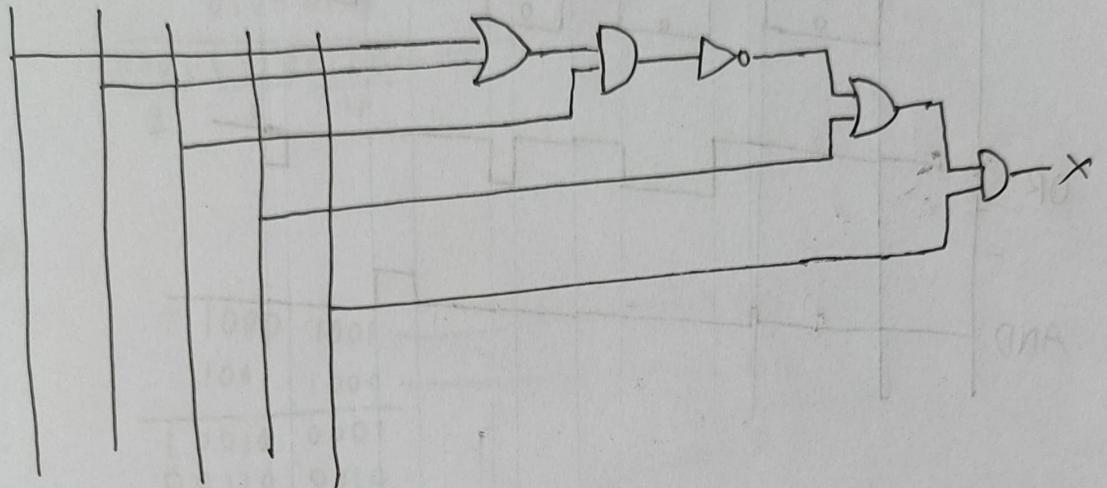
Seacal-D
Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX
Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

L-6 / 13.02.2023 /

$$X = (D + \overline{(A+B)}C)E$$

A B C D E

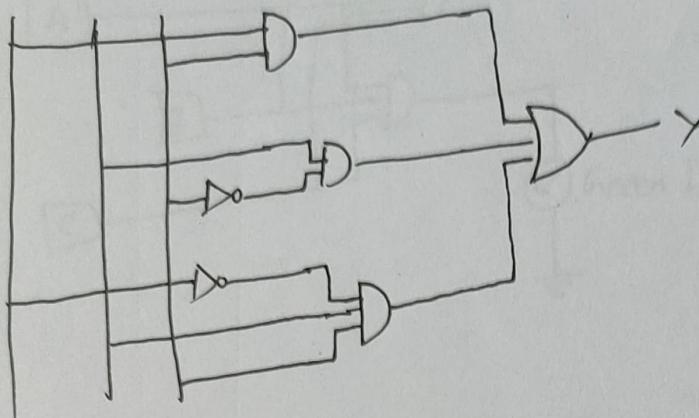


Truth Table: $X = \bar{A}B + BC$

A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

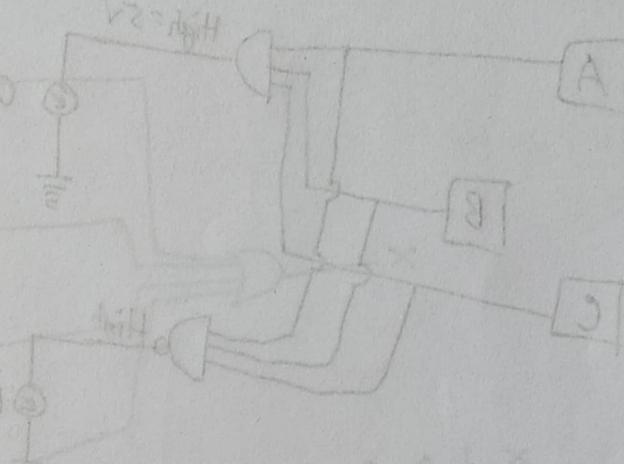
$$\textcircled{*} \quad Y = AC + B\bar{C} + \bar{A}BC$$

A B C

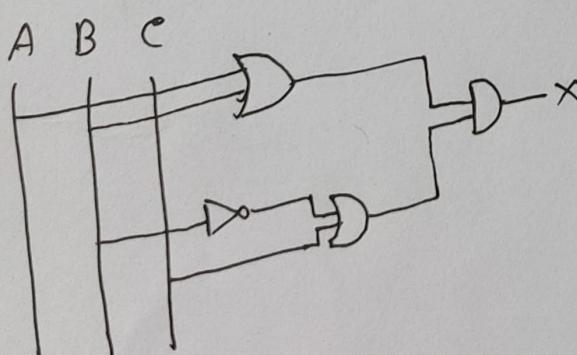


X	Y	A
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1



$$\textcircled{*} \quad X = (A+B)(\bar{B}+C)$$



T.I.

A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

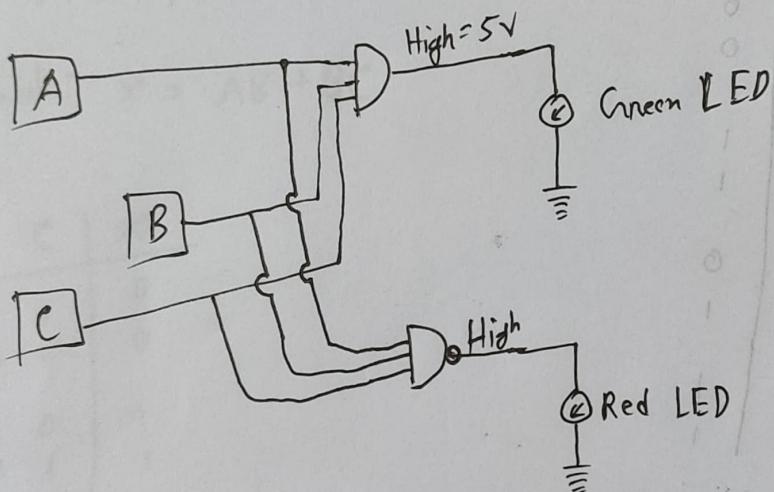
Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

(*) Extended = High

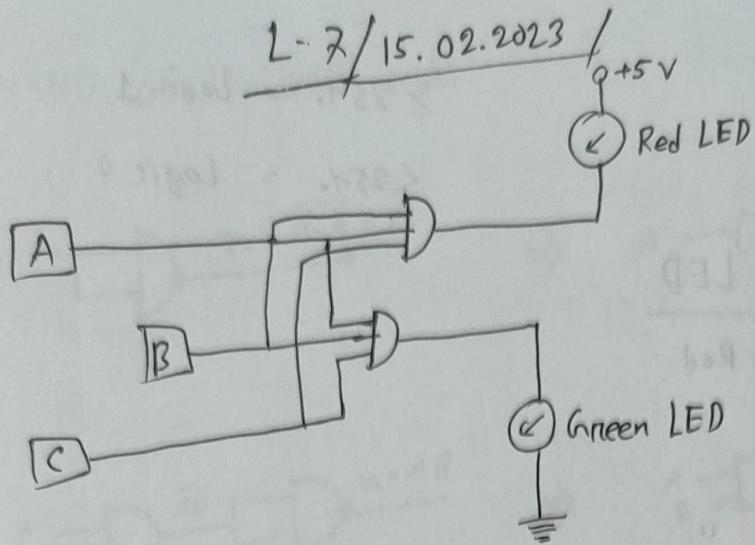
Retracted = Low

A	B	C	x
0	0	0	0 Red
0	0	1	0 :
0	1	0	0 :
0	1	1	0 1
1	0	0	0 :
1	0	1	0 :
1	1	0	0 Red
1	1	1	1 Green



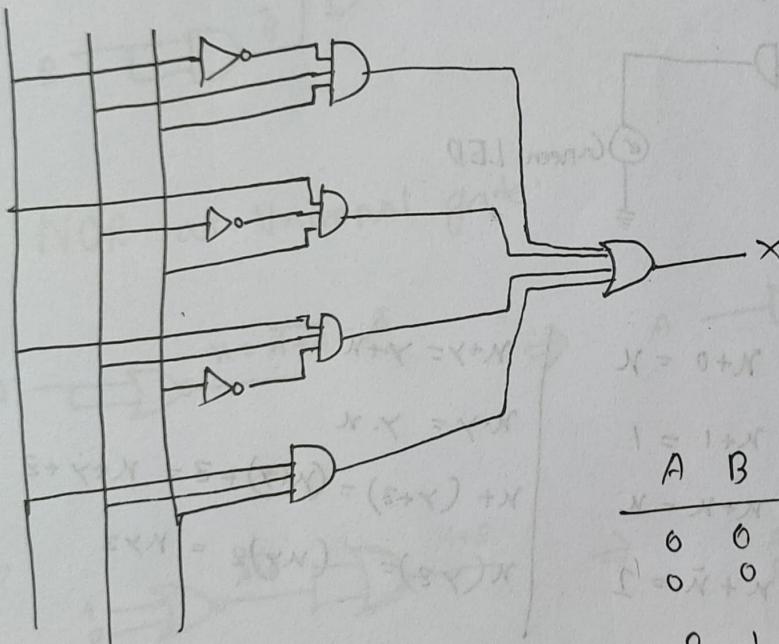
(*) Page - 20 : Using One Gate !

L-2 / 15.02.2023



$$\textcircled{*} \quad X = \bar{A}BC + A\bar{B}C + AB\bar{C} + ABC$$

A B C



A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

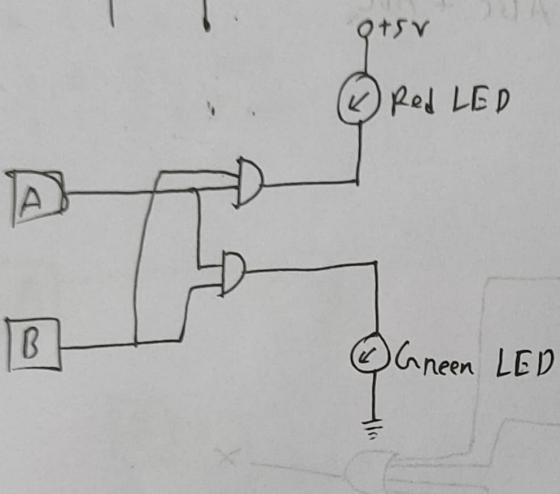
Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

⊗ Tank Question:

$\geq 25\text{A}$ = Logic 1

$< 25\text{A}$ = Logic 0

A	B	Y	LED
0	0	0	Red
0	1	0	"
1	0	0	"
1	1	1	Green



$$A \cdot 0 = 0$$

$$x \cdot 1 = x$$

$$x \cdot x = x$$

$$x \cdot \bar{x} = 0$$

$$x + 0 = x$$

$$x + 1 = 1$$

$$x + x = x$$

$$x + \bar{x} = 1$$

$$x + y = y + x$$

$$x \cdot y = y \cdot x$$

$$x + (y + z) = (x + y) + z = x + y + z$$

$$x(yz) = (xy)z = xyz$$

$$x(y+z) = xy + xz$$

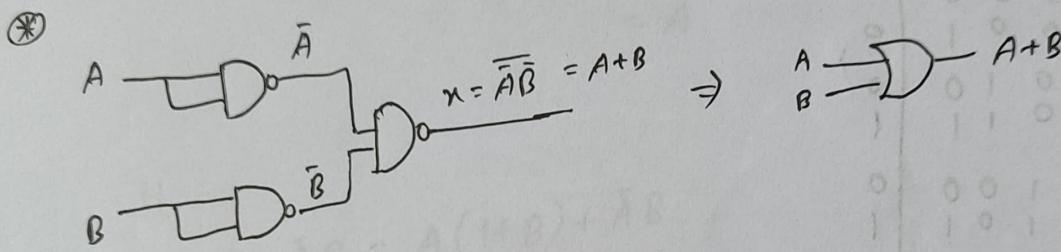
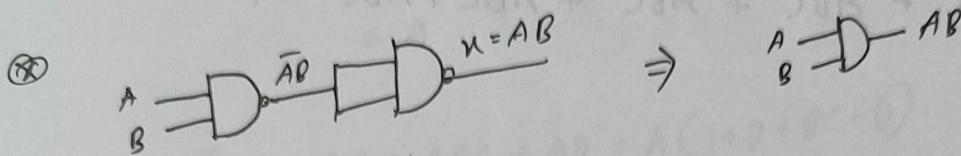
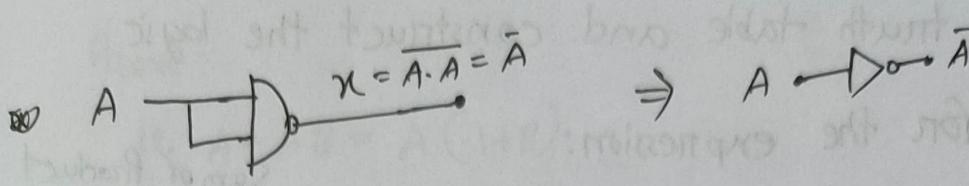
$$(w+x)(y+z) = wy + xy + wz + xz$$

$$x + xy = x$$

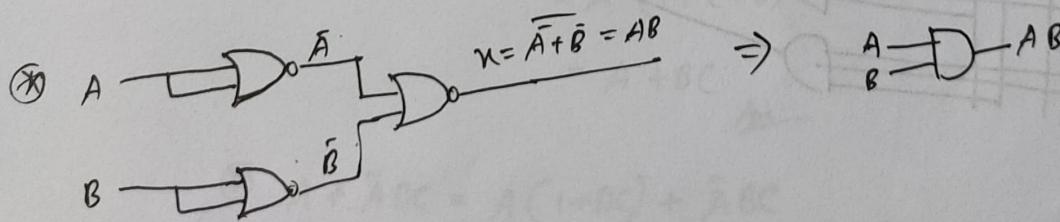
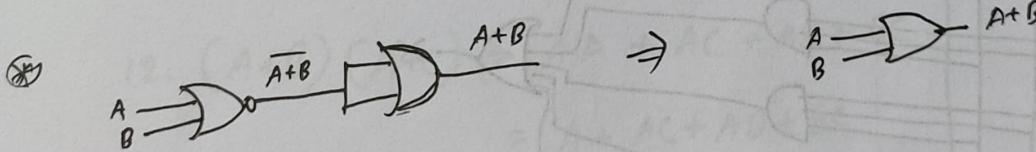
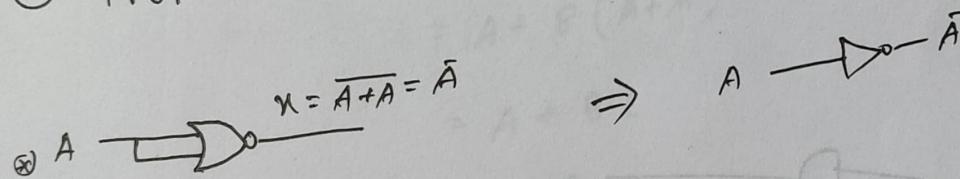
$$x + \bar{x}y = x + y$$

$$\bar{x} + xy = \bar{x} + y$$

⊗ NAND as Universal gate:



⊗ NOR as Universal gate:



Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

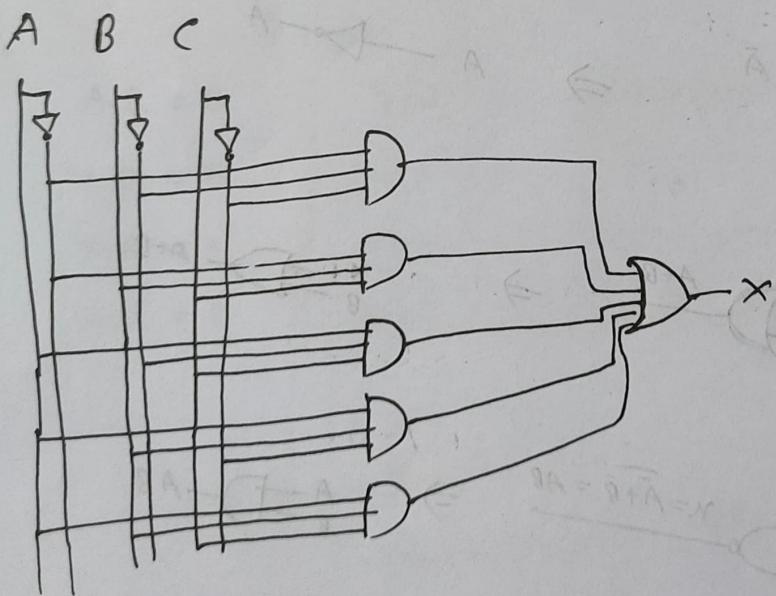
L-8 / 20.02.2023 /

- ④ Draw the truth table and construct the logic circuit for the expression:

Sum of Product

$$X = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}C + AB\bar{C} + ABC \rightarrow SOP$$

A	B	C	X
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1



★ Basic Rule of Boolean Algebra from Slide.

Prove:

$$10. A + AB = A(1+B)$$

$$= A \cdot 1$$

$$= A$$

$$\textcircled{*} A + AB + ABC + AD = A(1+B+BC+D)$$

$$= A \cdot 1$$

$$= A$$

11.

$$A + \bar{A}B = A(1+B) + \bar{A}B$$

$$= A + AB + \bar{A}B$$

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

$$= A + B \cdot 1$$

$$= A + B$$

$$12. (A+B)(A+C) = A \cdot A + AC + AB + BC$$

$$= A + AC + AB + BC$$

$$= A(1 + C + B) + BC$$

$$= A + BC$$

$$\textcircled{*} A + \bar{A}BC = A(1+BC) + \bar{A}BC$$

$$= A + ABC + \bar{A}BC$$

$$= A + BC(A + \bar{A})$$

$$= A + BC \cdot 1$$

$$= A + BC$$

Seacal-D

Calcium Carbonate (From Coral Source) and
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Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

⊗ $\overline{XY} = \bar{X} + \bar{Y}$

$\bar{X} \bar{Y}$ → NOT
NAND

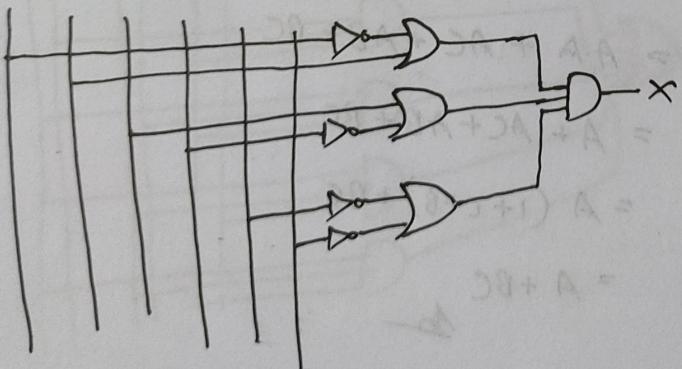
② $\overline{X+Y} = \bar{X}\bar{Y}$

$\bar{X} \bar{Y}$ → NOR

⊗ D'Morgan's Law Prove from Slide 4, Page -11
(Quiz-2 Must)

$$\begin{aligned} \overline{AB + \bar{C}D + EF} &= \overline{AB} \cdot \overline{\bar{C}D} \cdot \overline{EF} \\ &= (\bar{A} + \bar{B})(\bar{\bar{C}} + \bar{D})(\bar{E} + \bar{F}) \\ &= (\bar{A} + B)(C + \bar{D})(\bar{E} + \bar{F}) \rightarrow \text{POS} \end{aligned}$$

A B C D E F



A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

$$\Rightarrow \text{XOR} \Rightarrow \bar{A}B + A\bar{B}$$

$$XNOR \Rightarrow \overline{\bar{A}B + A\bar{B}}$$

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

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

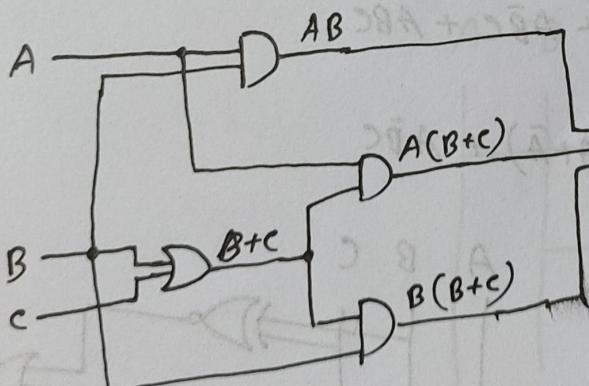
$$= A\bar{A} + AB + \bar{A}\bar{B} + B\bar{B}$$

$$= 0 + AB + \bar{A}\bar{B} + 0$$

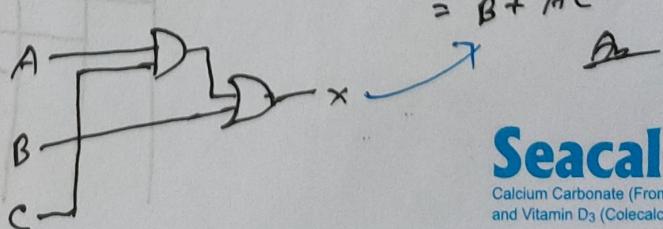
$$= AB + \bar{A} \bar{B}$$

X	Y	Z	A
1	0	0	0
0	1	0	0
0	0	1	1
1	1	1	1

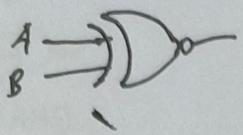
A	B	X	$\bar{A}\bar{B}$
0	0	0	1
0	1	0	0
1	0	0	0
1	1	1	1



$$\begin{aligned}
 &= AB + A(B+C) + B(B+C) \\
 &= AB + AB + AC + BB + BC \\
 &= AB + AC + B + BC \\
 &= AC + B(A+1+C)
 \end{aligned}$$



L-10/27.02.2023/



XNOR

$$\overline{A\bar{B} + \bar{A}B} = \overline{A\bar{B}} \overline{\bar{A}B}$$

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

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

A	B	π
0	0	1
0	1	0
1	0	0
1	1	1

$$= (\bar{A}A + \bar{A}\bar{B} + AB + B\bar{B})$$

$$= \bar{A}\bar{B} + AB$$

= XNOR

$$\pi = \overline{\bar{A}\bar{B} + AB} = A\bar{B} + \bar{A}B$$

\sum_{XOR}

(*)

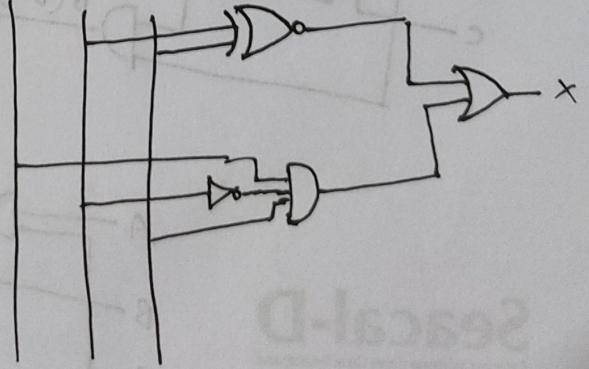
$$\bar{A}BC + A\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C} + A\bar{B}C + ABC$$

$$= BC(\bar{A} + A) + \bar{B}\bar{C}(A + \bar{A}) + A\bar{B}C$$

$$= BC + \bar{B}\bar{C} + A\bar{B}C$$

$$= \overline{B \oplus C} + A\bar{B}C$$

A B C



$$X = \overline{AB + AC} + \bar{A}\bar{B}C \longrightarrow 7 \text{ gates}$$

$$= \overline{AB} \cdot \overline{AC} + \bar{A}\bar{B}C$$

$$= (\bar{A} + \bar{B})(\bar{A} + \bar{C}) + \bar{A}\bar{B}C$$

$$= \bar{A}\bar{A} + \bar{A}\bar{C} + \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{B}C$$

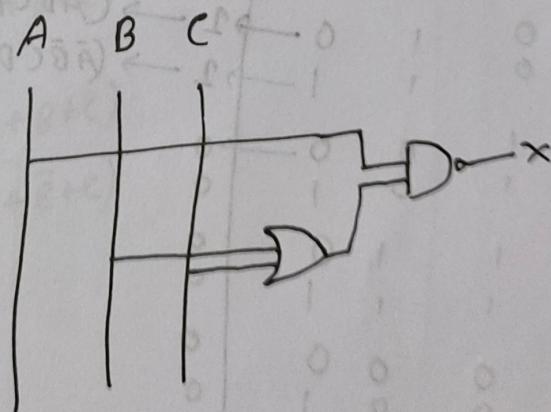
$$= \bar{A} + \bar{A}\bar{C} + \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{B}C$$

$$= \bar{A}(1 + C + \bar{B} + \bar{B}\bar{C}) + \bar{B}\bar{C}$$

$$= \bar{A} + \bar{B}\bar{C} \longrightarrow 5 \text{ gates}$$

$$\Rightarrow \bar{A} + \overline{B+C} \longrightarrow 3 \text{ gates}$$

$$= \overline{A(B+C)} \longrightarrow 2 \text{ gates}$$



Seacal-D

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Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

(*) $A\bar{B}C + \bar{A}\bar{B} + A\bar{B}\bar{C}D$ → make it Std SOP

$$= A\bar{B}C(D + \bar{D}) + \bar{A}\bar{B}(C + \bar{C}) + A\bar{B}\bar{C}D$$

$$= A\bar{B}CD + A\bar{B}C\bar{D} + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$$

$$= A\bar{B}CD + A\bar{B}C\bar{D} + \bar{A}\bar{B}C(D + \bar{D}) + \bar{A}\bar{B}\bar{C}(D + \bar{D}) + A\bar{B}\bar{C}D$$

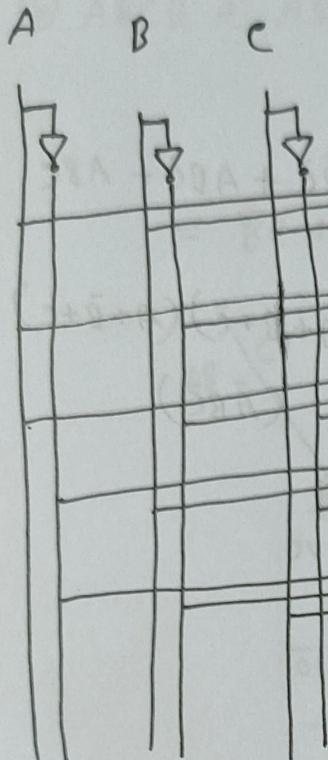
$$= A\bar{B}CD + A\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$$

= Std SOP.

T.T

A	B	C	D	n
0	0	0	0	1 → $(\bar{A}\bar{B}\bar{C}\bar{D})$
0	0	0	1	1 → $(\bar{A}\bar{B}\bar{C}D)$
0	0	1	0	1 → $(\bar{A}\bar{B}C\bar{D})$
0	0	1	1	1 → $(\bar{A}\bar{B}C D)$
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1 → $(A\bar{B}C\bar{D})$
1	0	1	1	1 → $(A\bar{B}C D)$
1	1	0	0	0
1	1	0	1	1 → $(A\bar{B}\bar{C}D)$
1	1	1	0	0
1	1	1	1	0

$$\textcircled{*} (A+B+C) (A+\bar{B}+C) (A+\bar{B}+\bar{C}) (\bar{A}+B+\bar{C}) (\bar{A}+\bar{B}+C)$$



A	B	C	π	$(A+B+C)$
0	0	0	0	$(A+B+C)$
0	0	1	1	
0	1	0	0	$(A+\bar{B}+C)$
0	1	1	0	$(A+\bar{B}+\bar{C})$
1	0	0	1	$(\bar{A}+B+\bar{C})$
1	1	0	1	$(\bar{A}+\bar{B}+C)$

Karnaugh Map

π	0	1	2	3	4	5	6	7	A
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	0
2	0	0	1	1	0	0	1	1	0
3	1	1	0	0	1	1	0	0	0
4	0	0	0	0	0	0	0	0	0
5	1	1	0	0	1	1	0	0	1
6	1	0	1	0	0	1	0	1	1
7	0	1	0	1	0	0	1	0	1

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

A	B	C	n
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

$$SOP: \bar{A}BC + A\bar{B}\bar{C} + AB\bar{C} + ABC$$

$$POS: (A+B+C)(A+B+\bar{C})(A+\bar{B}+C) \\ (\bar{A}B\bar{C})$$

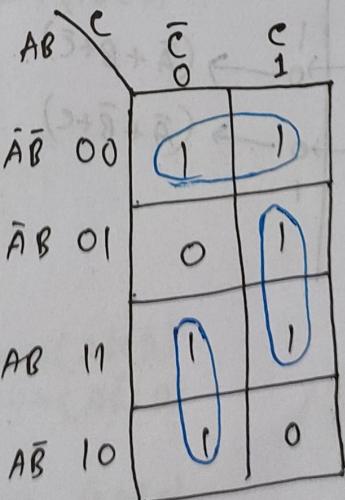
Karnaugh Map:

A	B	C	n
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

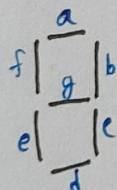
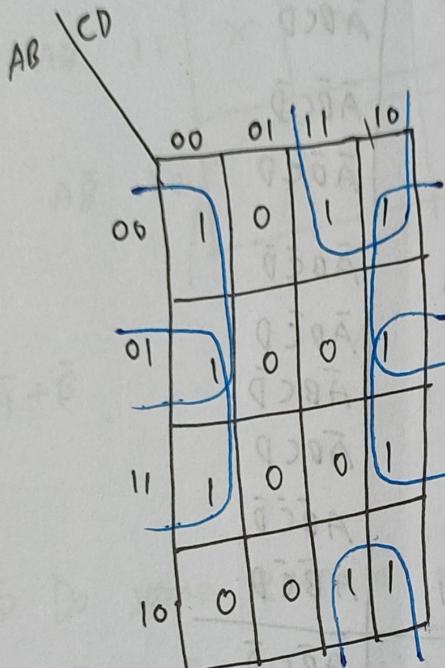
$$SOP: \bar{A}BC + A\bar{B}\bar{C} + AB\bar{C} + ABC + \bar{A}\bar{B}\bar{C} +$$

$$\bar{A}\bar{B}C$$

$$= \bar{A}\bar{B} + BC + AC$$



$$\begin{aligned}
 \textcircled{b} \quad & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + A\bar{B}C\bar{D} + \bar{A}\bar{B}C\bar{D} + \\
 & \bar{A}\bar{B}C\bar{D} + A\bar{B}C\bar{D} + A\bar{B}C\bar{D} \\
 = & \bar{B}C + \bar{A}\bar{D} + B\bar{D}
 \end{aligned}$$



$$a = 02356789$$

$$b = 01234789$$

$$c = 012456789$$

$$d = 0235689$$

$$e = 0268$$

$$f = 045689$$

$$g = 2345689$$

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

For Segment a:

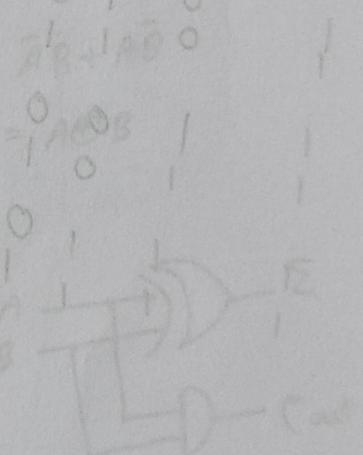
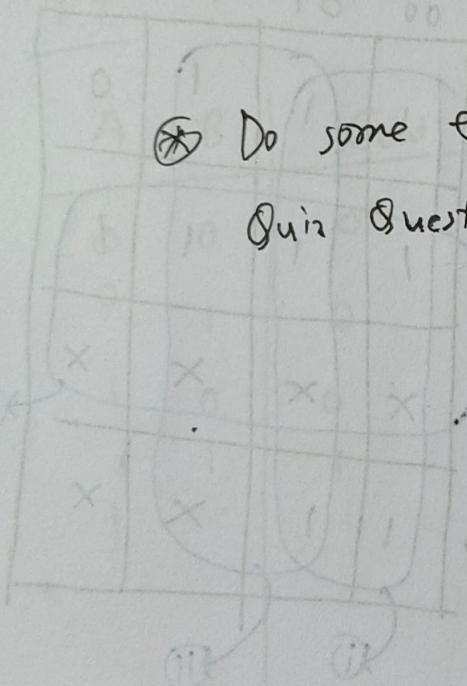
	A	B	C	D	χ	
0	0	0	0	0	1	$\bar{A}\bar{B}\bar{C}\bar{D}$
1	0	0	0	1	⊗	$\bar{A}\bar{B}CD$
2	0	0	1	0	1	$\bar{A}\bar{B}C\bar{D}$
3	0	0	1	1	1.	$\bar{A}\bar{B}CD$
4	0	1	0	0	⊗	$\bar{AB}\bar{C}\bar{D}$
5	0	1	0	1	1	$\bar{A}\bar{B}\bar{C}D$
6	0	1	1	0	1	$\bar{A}\bar{B}C\bar{D}$
7	0	1	1	1	1	$\bar{A}\bar{B}CD$
8	1	0	0	0	1	$A\bar{B}\bar{C}\bar{D}$
9	1	0	0	1	1	$A\bar{B}\bar{C}D$
10	1	0	1	0	x	$A\bar{B}C\bar{D}$
11	1	0	1	1	x	$A\bar{B}CD$
12	1	1	0	0	x	$AB\bar{C}\bar{D}$
13	1	1	0	1	x	$AB\bar{C}D$
14	1	1	1	0	x	$ABC\bar{D}$
15	1	1	1	1	x	$ABC D$

	AB	$\bar{A}\bar{B}$	$\bar{B}D$	$\bar{C}D$	CD	$C\bar{D}$
	00	01	11	10		
$\bar{A}B$	00	1	X	1	1	
$\bar{A}B$	01	X	1	1		
AB	11	X	X	X	X	
$A\bar{B}$	10	1	1	X	X	

$$\therefore X = \bar{A} + \bar{B}$$

④ Do some exercise for other segment

Quiz Question, Mid Question Must.



$$8+4+5 = Y$$

Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

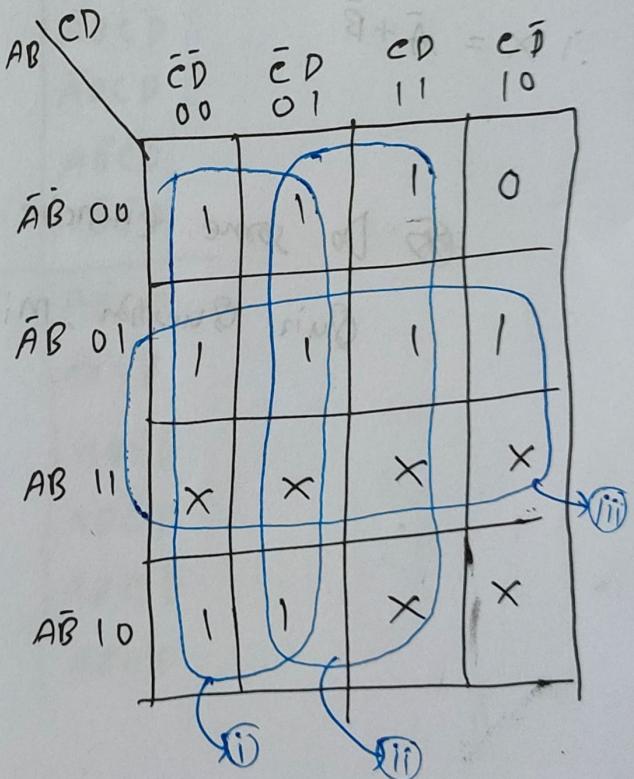
L-13 / 15.03.2023

Numbers when segment C will be activated:

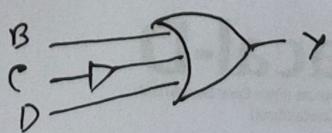
$\Rightarrow 012456789$

A	B	C	D	Y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	x
1	0	1	1	x
1	1	0	0	x
1	1	0	1	x
1	1	1	0	x
1	1	1	1	x

$$\begin{aligned}
 Y = & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD \\
 & + \bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} \\
 & + \bar{A}BCD + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D
 \end{aligned}$$



$$\therefore Y = \bar{C} + \bar{D} + B$$



$$\otimes (\overline{\bar{A}\bar{B}\bar{C}})C + \overline{\bar{A}\bar{B}\bar{C}} + D$$

$$= \overline{\bar{A}\bar{B}\bar{C}} (C+1) + D$$

$$= \overline{\bar{A}\bar{B}\bar{C}} + D$$

$$= \bar{A} + \bar{B} + \bar{C} + D$$

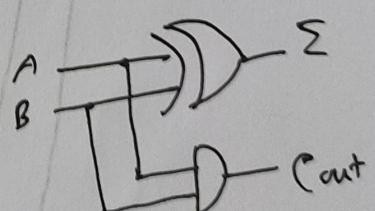
$$= A + B + C + D$$

Half Adder

T.T.

A	B	Cout	Σ
0	0	0	0
0	1	0	$1 \rightarrow \bar{A}B$
1	0	0	$1 \rightarrow A\bar{B}$
1	1	1	0

$$\begin{aligned} & \bar{A}B + A\bar{B} \\ & = A \oplus B \end{aligned}$$



Seacal-D

Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

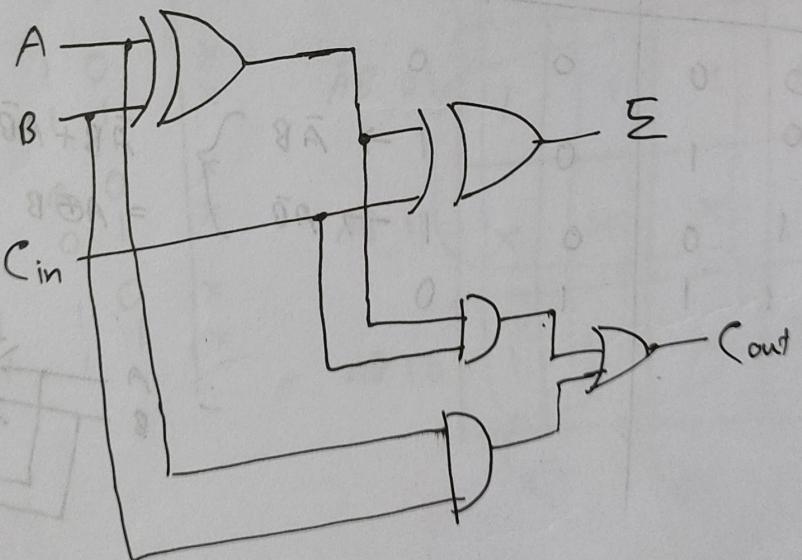
Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

Full Adder

T.T.

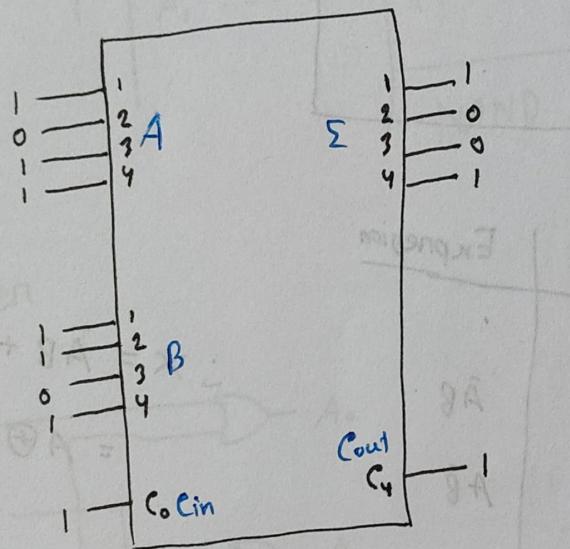
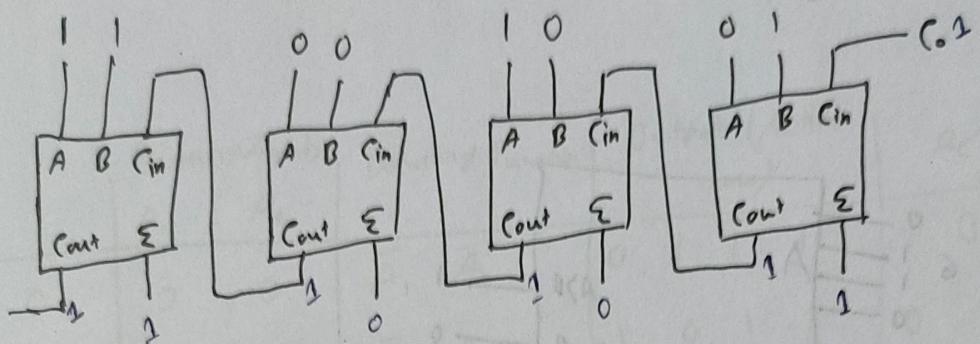
A	B	C _{in}	C _{out}	Σ
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	1
1	1	1	1	1

$$\Rightarrow (A \oplus B) \oplus C_{in}$$



$$A = 1010$$

$$B = 1001$$



Seacal-D

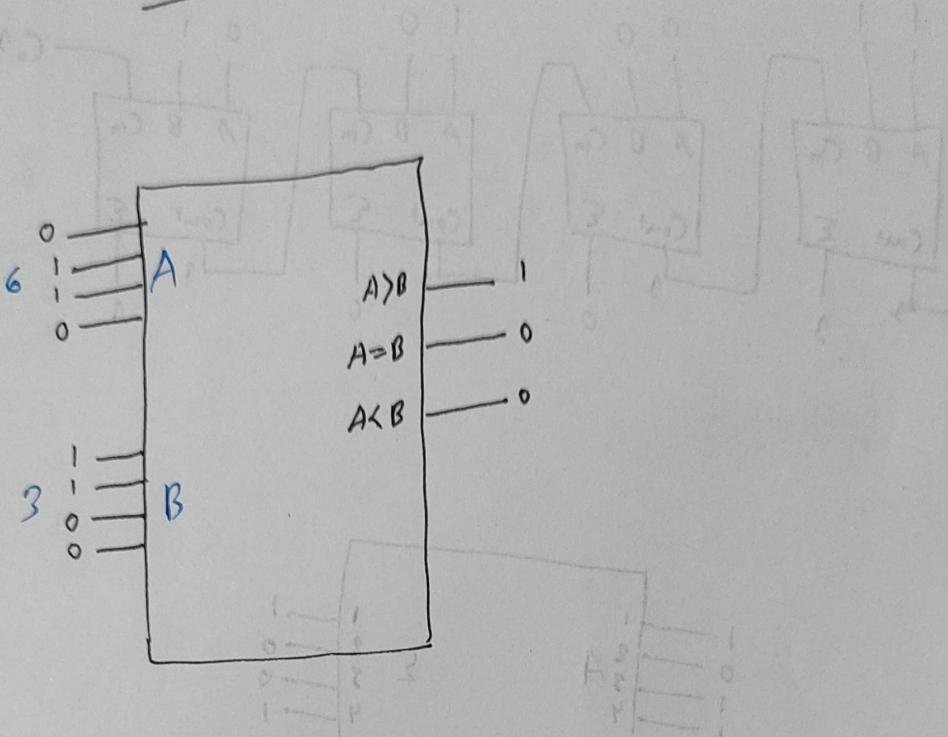
Calcium Carbonate (From Coral Source) and
Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source)
and Vitamin D₃ (Colecalciferol)

L-14 / 20.03.2023/

Comparator



A	B	X	Expression
0	0	0	$\bar{A}B$
0	1	1	$\bar{A}\bar{B}$
1	0	1	$A\bar{B}$
1	1	0	

$$\begin{aligned} \therefore X &= \bar{A}B + A\bar{B} \\ &= A \oplus B \end{aligned}$$

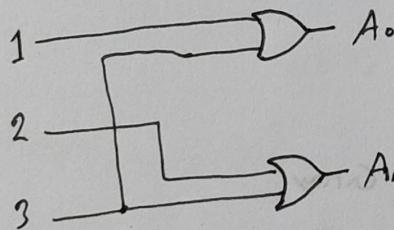


⊗ 2 bit OR (1-of-4) decoder:

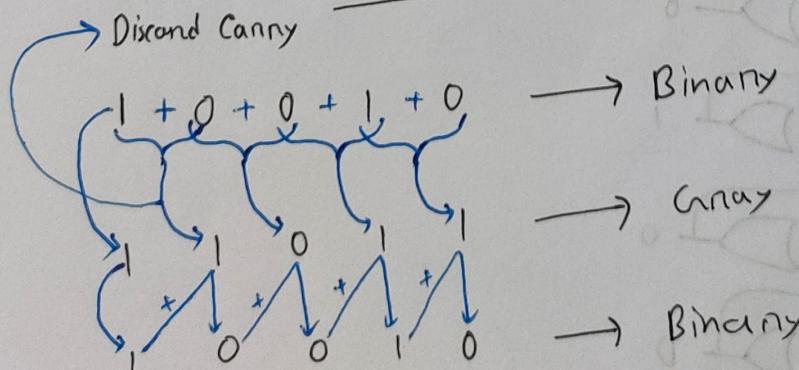
Binary Inputs		Decoding Function	Outputs (Active Low)	Active High
A ₁	A ₀			
0	0	\bar{A}_1, \bar{A}_0	0 1 1 1	1 0 0 0
1	0	\bar{A}_1, A_0	1 0 1 1	0 1 0 0
2	1	A_1, \bar{A}_0	1 1 0 1	0 0 1 0
3	1	A_1, A_0	1 1 1 0	0 0 0 1

NAND Gate AND Gate

⊗ Encoder



⊗ Gray Code



Seacal-D

Calcium Carbonate (From Coral Source) and Vitamin D₃ (Colecalciferol)

Seacal-DX

Calcium Carbonate (From Coral Source) and Vitamin D₃ (Colecalciferol)