

Q.1 a)

-59 → express as an 8 bit sign-number

+59.

00111011 → convert it into -59 sign bit

~~10111011~~
~~110000100~~

+1

convert it into 1st complement

for the 2nd complement

~~110000100~~

↓

convert back in Decimal

$$-128 + 64 + 4 + 1 \Rightarrow$$

$$-128 + 64 \Rightarrow$$

$$-64 \Rightarrow \boxed{-59} \text{ Answer}$$

b)

10110111 → sign number in 1st complement form.
convert into 1st complement

$$-(01001000) = \boxed{-72} \text{ Answer}$$

c)

$$01100101 - 11101000$$

convert into decimal

$$101 - (24) \Rightarrow$$

$$101$$

$$+ 24$$

$$\hline 125$$

$$01100101$$

$$11101000$$

$$+ 00011000$$

$$00010111$$

1st complement

$$\boxed{01111101} \Rightarrow \text{Answer}$$

+1

↓

=

$$00010000$$

→ 2nd complement

$$\boxed{125} \text{ Answer}$$

d = A D8FC \rightarrow decimal.

101011011001111100

710908 \rightarrow decimal.

e) (6789)₁₀ \rightarrow into Octal.

15205₈ \rightarrow

Q2 Binary to Gray.

31 \Rightarrow 00011111
32 \Rightarrow 00100000
33 \Rightarrow 00100001
34 \Rightarrow 00100010

00011111 \rightarrow Binary
00010000 \rightarrow Gray code

00100000 \rightarrow Binary
00110000 \rightarrow Gray code

00100001 \rightarrow Bin
00110001 \rightarrow Gray.

00100010 \rightarrow Bin
00110011 \rightarrow Gray.

BCD \rightarrow 399 758

$$\begin{array}{r}
 \overset{+}{0}\overset{+}{0}\overset{+}{1}\overset{+}{1} \quad \overset{+}{1}\overset{+}{0}\overset{+}{0}\overset{+}{1} \quad 1001 \\
 + \overset{+}{0}\overset{+}{1}\overset{+}{1}\overset{+}{1} \quad \overset{+}{0}\overset{+}{1}\overset{+}{0}\overset{+}{1} \quad 1000 \\
 \hline
 1010 \quad 1110 \quad 10001 \\
 + 0110 \quad 0110 \quad 0110 \\
 \hline
 00010001 \quad 0101 \quad 0111
 \end{array}$$

$$\begin{array}{r}
 \overset{+}{3}\overset{+}{9}\overset{+}{9} \\
 758 \\
 \hline
 1157
 \end{array}$$

1 1 5 7 Answer

Q) 5778 \rightarrow into single precision point.

$$\begin{array}{r|l}
 2 & 5778 \\
 2 & 2889 \quad -0 \\
 2 & 1444 \quad -1 \\
 2 & 722 \quad -0 \\
 2 & 361 \quad -0 \\
 2 & 180 \quad -1 \\
 2 & 90 \quad -0 \\
 2 & 45 \quad -0 \\
 2 & 22 \quad -1 \\
 2 & 11 \quad -0 \\
 2 & 5 \quad -0 \\
 2 & 2 \quad -1 \\
 2 & 1 \quad -1
 \end{array}$$

$$1100010010010010_2$$

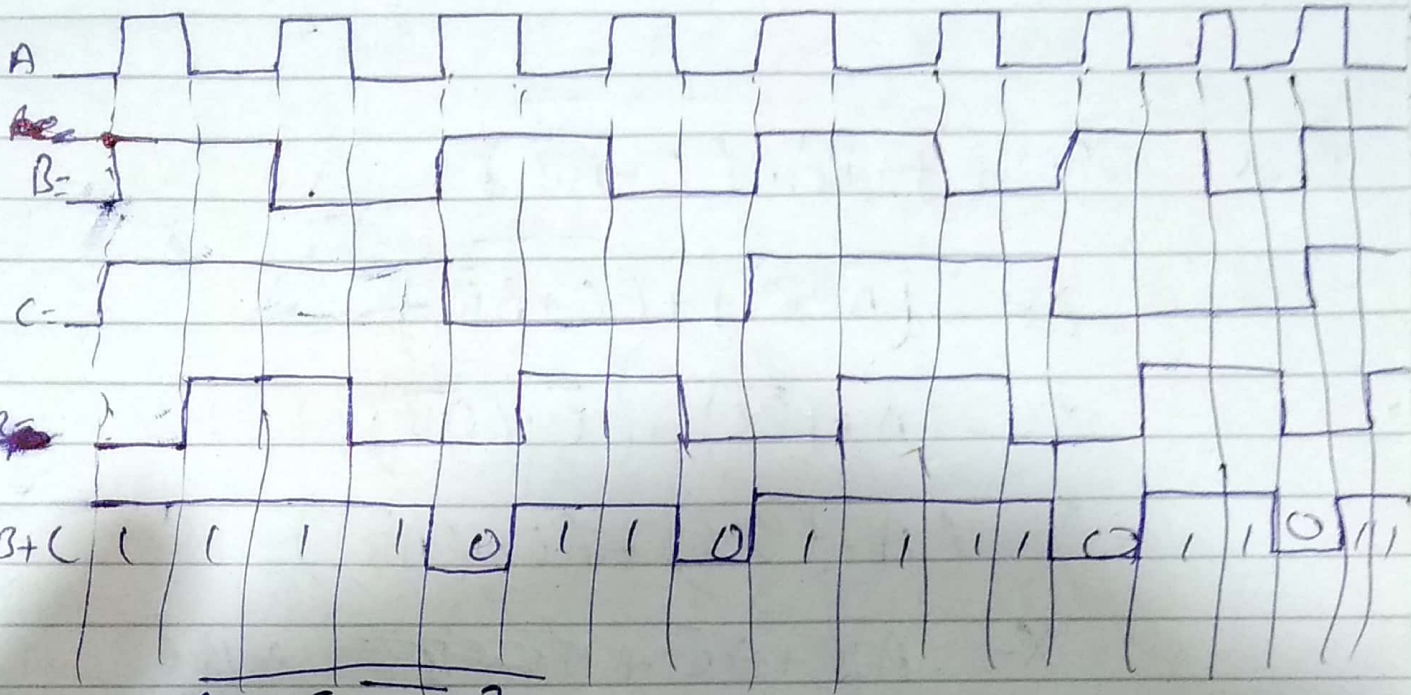
$$1.100010010010010 \times 2^{12}$$

$$12+127=139 \Rightarrow 10001011$$

Answer

01000101111000100100100000000000

Q3.

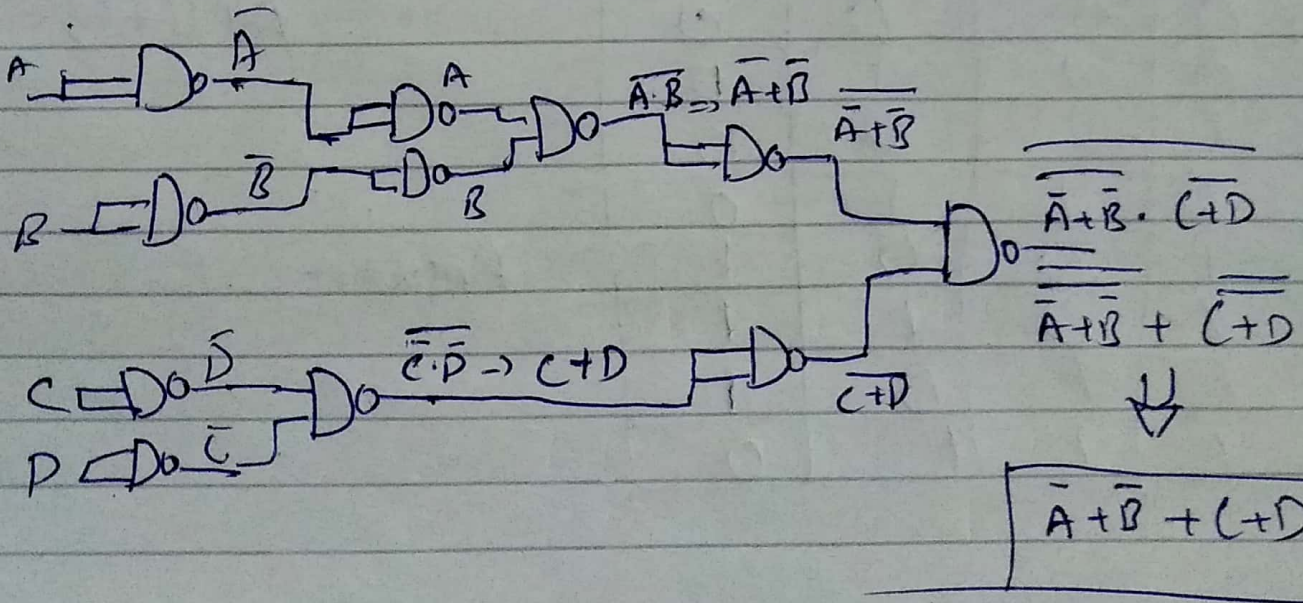


b) $\Rightarrow AB[(C+D)]$

$$\overline{AB} + \overline{(C+D)}$$

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

NAND Gate



Q30 $X = \overline{(A+B)} \cdot (C + \overline{A}\overline{B})$

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

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

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

$$X = \overline{A}\overline{B} + \overline{A}\overline{C} + \overline{A}\overline{B}\overline{C}$$

$$X = \overline{A}\overline{B} + \overline{A}\overline{C}$$

$$\overline{A}\overline{B}\overline{C}$$

$$\overline{A}\overline{B}$$

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

$$(\overline{A}\overline{B} + \overline{A}\overline{C})$$

$$\overline{A}(\overline{B} + \overline{C})$$

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

Answer.

Q4 a)

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

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

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

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

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

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

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

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

$$\boxed{A+B} \rightarrow \text{Answer}$$

Q4(b) c)

$$\Sigma m(0, 2, 4, 7, 8, 11, 13, 15)$$

$$0 = 0000$$

$$2 = 0010$$

$$4 = 0100$$

$$7 = 0111$$

$$8 = 1000$$

$$11 = 1011$$

$$13 = 1101$$

$$15 = 1111$$

	00	01	11	10
00	1	0	0	1
01	1	0	1	0
11	0	1	1	0
10	1	0	1	0

$$\Rightarrow \boxed{\bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{D} + \bar{A}C\bar{D} + BCD + ACD + ABD}$$

$$\Rightarrow \boxed{(A+B+\bar{D})(B+C+\bar{D})(A+C+\bar{D})(B+\bar{C}+\bar{D}) \cdot (A+\bar{C}+\bar{D})(\bar{A}+\bar{B}+\bar{D})}$$