NAME Fayyaz Ahmad

ID 13460

paper Digital logic Design.

Q1:- Convert each of the Following:-

(a) $45.25_{10} = (?)_2$

2	45
2	22 – 1
2	5 – 1
2	2 – 1
	1 – 0

$.25 \times 2$

$0.5 \times 2 = 1$

Answer

(101101.01) Ans

(b) $(01111111.10)_2 = (?)_{10}$

Solve:- $(0\times2^7) + (1\times2^6)(1\times2^5) + (1\times2^4) + (1\times2^3) + (1\times2^2) + (1\times2^1) + (1\times2^0)$

$= (1\times2^{-1}) + (0\times2^{-2}) + (1\times2^{-3}) + (0\cdot2^{-4})$

$64 + 32 + 16 + 8 + 4 + 2 + 1 \cdot 0.5 + 0.125$

127.625_{10} Ans.

(6) part (c) $(3A6F)_{16} = (?)_2$

Solve

$3 = 0011$

$A = 1010$

$6 = 0110$

$F = 1111$

$(3A6F)_{16} = (0011101001101111)_2$

Answer.

part (d) $-1_{10} = (?)_2$

Ans $1 = 10000$

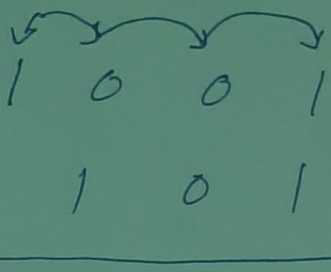
$= 00000000$

$1's = \begin{array}{r} 1111\ \ 1111 \\ 1111\ \ 1111 \\ \hline +1 \\ \hline 00000000 \end{array}$

$(+1)_2$ Answer

2: Q1 part (g) $(1001010)_2 = (?)_{Gray}$

Solve



$(1101111)_{Gray}$ Answer.

Q1 h:- $\&111000 = (?101001)$ Eeven paority.

Solve:- 101001 is odd since it is not divisible by The 2

As reminder is equal to 1 when divided by 2

(4)

Q1 part (a) $10101010_2 = ?_{10}$

$$1\times2^7 + 0\times2^6 + 1\times2^5 + 0\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0$$

$$128 + 32 + 8 + 2$$

$$\Rightarrow (170)_{10} \text{ Ans.}$$

Question 2 Calculate each of the following:

(a) $9B_{10} + 8A_{16}$

$$\begin{array}{r} 9\ B_{16} \\ 8\ A_{16} \\ \hline D\ 5\ \text{Ans} \end{array}$$

(b) $F7_{16} - D6_{16}$

$$\begin{array}{r} F\ 7_{16} \\ -\ D\ 6_{16} \\ \hline 2\ 1\ \text{Ans.} \end{array}$$

Q2 (c) $(1100)_2 + (1011)_2$

$$\begin{array}{r} 1100 \\ +\ 1011 \\ \hline 10111 \end{array}$$

Answer.

Q2 part (d)

$$01111111 - 00000111_2$$

$$\begin{array}{r} 01111111 \\ -\ 00000111 \\ \hline 1111000 \end{array}$$

Ans.

Q3:: Determine the output waveforms For XOR and XNOR gates, given the input waveforms, A, and B in Figure 01.

Answer::

Solution::

The output waveForms are shown in Figure 01 notice that the XOR output is high only when both input are at opposite levels. notice that the XNOR output is high only when both iputs are the same

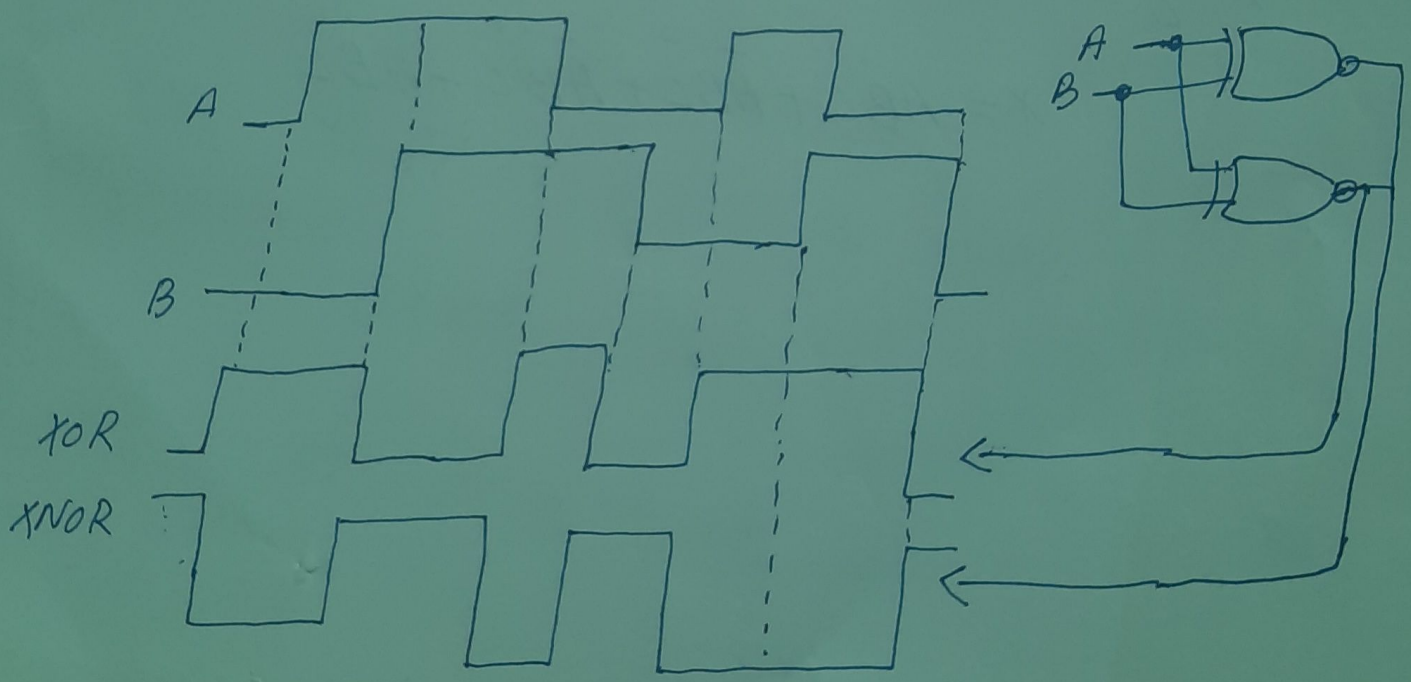
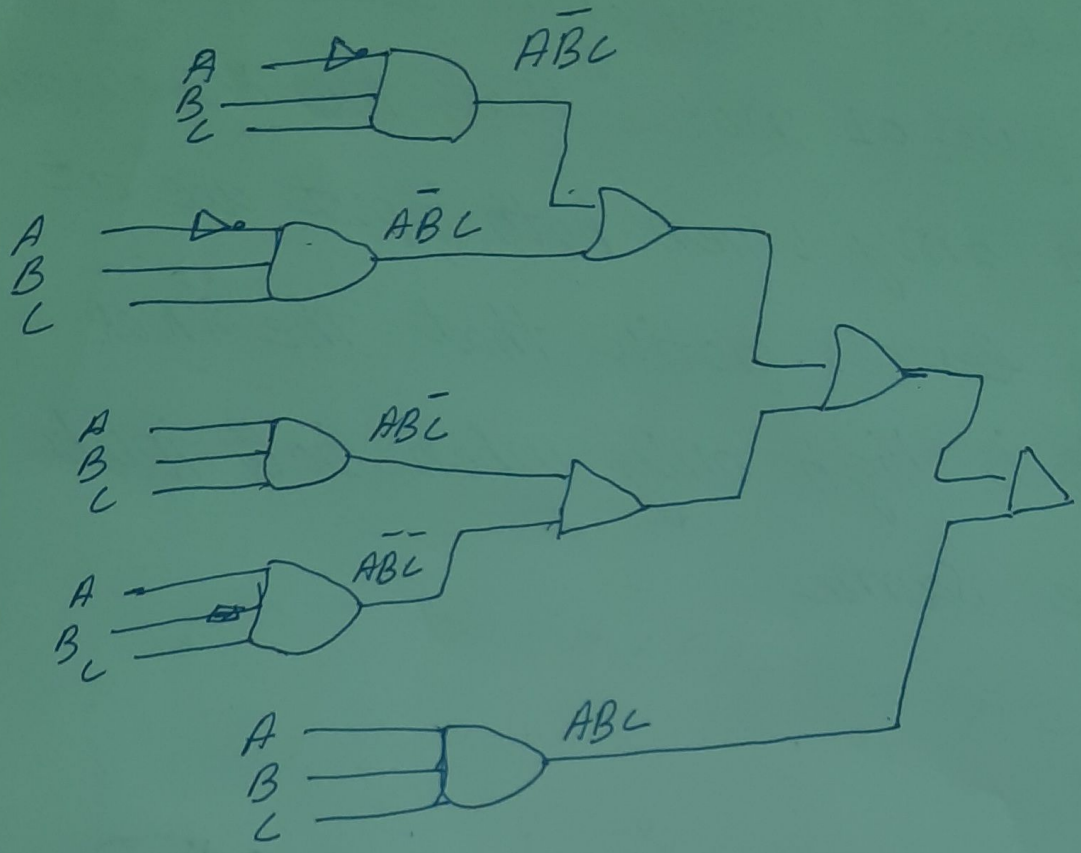


Fig 01

Q4@ draw the logic circuit For the following expression:

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

Solution



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

(8)

(b) using Boolean algebra, simplify the expression given in part (a).

Solution:- $\bar{A}B\bar{L} + A\bar{B}\bar{L} + \bar{A}\bar{B}\bar{L} + A\bar{B}L + ABL$

solution

step 1 Factor $B\bar{L}$ out of the First and last terms

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

step 2:- Apply rule 6 ($\bar{A} + A = 1$) to the term in parentheses and Factor $A\bar{B}$ from the second and last term

$$B\bar{L} \cdot 1 + A\bar{B}(\bar{L} + L) + \bar{A}B\bar{L}$$

Step 3:- Apply rule 4 (drop the 1) to the First term and rule 6 ($\bar{L} + L = 1$) to the term in parenthese

$$B\bar{L} + A\bar{B} \cdot 1 + \bar{A}B\bar{L}$$

Step 4:- Apply rule 4 (drop the 1) to the second Term

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

Q5a:: convert the Following expression to standard SOP form $A = \overline{\overline{x+y}+z}$?

Solution:: $\overline{\overline{\overline{x+y}+z} = (\overline{\overline{x+y}})\,\bar{z}}$

$= (x+y)\,\bar{z}$

$x\bar{z} + y\bar{z}$. Ans

(b) convert the SOP expression obtained in part (a) to standard ~~so~~ POS form.

Solve $x\bar{z} + y\bar{z} \rightarrow$ SOP Form

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

$\bar{z}(x+y) \rightarrow$ POS Form.

Q5(c) Develop a single truth table for the standard SOP and standard POS expressions obtained in part (a) and part (b) respectively.

Solution

SOP Truth Table

input			
x	y	z	output
0	0	1	1 → x+y
0	0	1	1 → x+y

POS Truth table

inputs			
x	y	z	output
0	0	1	1 x+y
0	0	1	1 x+y

Q6@ use a Karnaugh map to Find the minium sop Form For the Following Expression-

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

Solution

$\bar{A}\bar{B}\bar{C} = 000$

$A\bar{B}C = 001$

$\bar{A}B\bar{C} = 010$

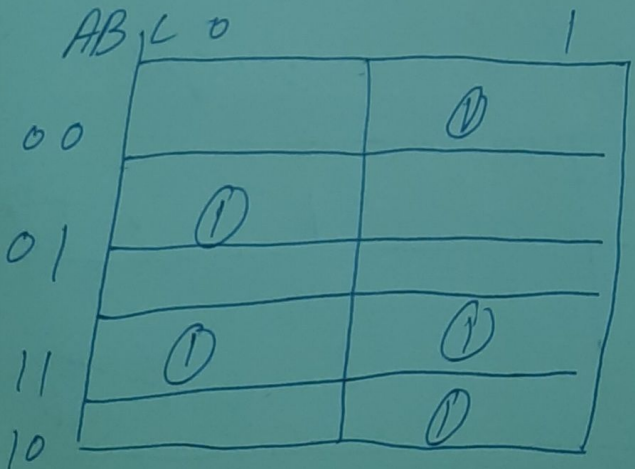
$AB\bar{C} = 110$

$ABC = 111$

$A\bar{B}C = 101$

Q6b:. Determine minimum pos form the Karnaugh map used in part @

Solution



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