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Reg# 16549

Semester :6th

Paper: DLD

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Q1: Convert each of the following

ⓐ $45.25_{10} = (?)_2$

$45.25_{10} = (\ )_2$

2	45
2	22 - 1
2	11 - 0
2	5 - 1
2	2 - 1
	1 - 0

$0.25 \times 2 = 0 + 0.5 = 0$

$0.5 \times 2 = 1 + 0.0 = 1$

$(101101.01)_2$

ⓑ $01111111.1010 = (?)_{10}$

$0.1111111.1010_2 = (\ )_{10}$

$= 0\times2^7 + 1\times2^6 + 1\times2^5 + 1\times2^4 + 1\times2^3 + 1\times2^2 + 1\times2^1 + 1\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 0\times2^{-3} + 0\times2^{-4}$

$= 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 1 + 2^{-1} + 2^{-3}$

$= 64 + 32 + 16 + 8 + 4 + 2 + \frac{1}{2} + \frac{1}{8}$

$= 127 + \frac{1}{2} + \frac{1}{8}$

$= (127.625)_{10}$

(c) $(3A6F)_{16} = (\ )_2$

$= 3A6F = \underbrace{0011}_{3}\ \underbrace{1010}_{A}\ \underbrace{0110}_{6}\ \underbrace{1111}_{F}$

$= (0011101001101111)_2$

(d) $10101010_2 = \pm(?)_{10}$

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

$= 2^7 + 2^5 + 2^3 + 2^1$

$= 128 + 32 + 8 + 2$

$= 170$

$= \pm(170)_{10}$

(e) $-1_{10}\ (?)$

$2 \mid -1$
$\ \ \mid 0 - 1$

$= -(01)_2$

$= -(01)_2$

(f) $156_{10} = (?)_{BCD}$

$= (000101010110)_{BCD}$

(g) $(1001010)_2 = (?)_{Gray}$

$= (1101111)_{Gray}$

(h) $111000 = (?101001)$ even parity

Make the parity even 1 or 0 as nessesary to make the total number of 1s even. The parity bit will be the left most bit

101001

Add 1

1101001 even parity

Q2:- (b) $F7_{10} - D6$.

$$\begin{array}{r} F7 \\ - D6 \\ \hline 21 \end{array}$$

$(21)_{16}$

(c) $(1100)_2 + (1011)_2$ use modulo-2)

$$\begin{array}{r} + (1100)_2 \\ (1011)_2 \\ \hline 10111 \end{array}$$

$(10111)_2$

(d) $(01111111)_2 - (00000111)_2$ (use 2's Complement

$(0111111)_2 - (00000111)_2$
y

(1) 00000111
11111000
+1
11111001

$01111111 + (-0000111)$

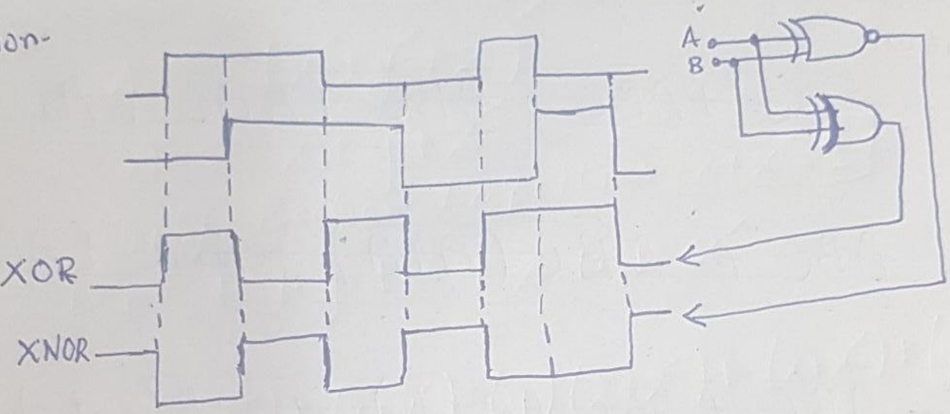
$$\begin{array}{r} 01111111 \\ + \quad 00000111 \\ \hline 01111000 \end{array}$$

2's Complement
(-00000111)

01111000Ans-

Q3:- Determine the output waveforms for the XOR & XNOR gates, given the input waveforms, A & B, in Figure 01.

Solution-

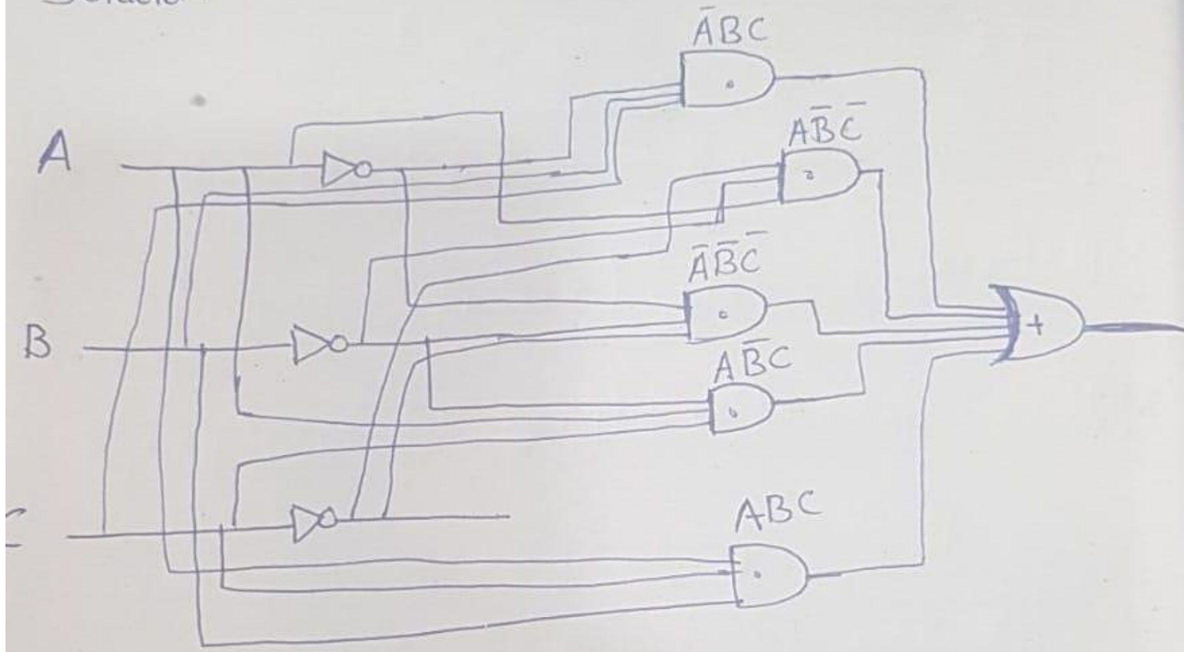


Q4:-

(a) 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:-



Q4

(b) Using Boolean algebra, Simplify the expression $X = \bar{A}BC + A\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C} + A\bar{B}C + ABC$

Solution-

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

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

$A+A'=1$

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

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

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

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

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

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

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

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

Q5. (a) Convert the following expressions to Standard SOP form: $A=\overline{\overline{X+Y}+Z}$

Solution $A = \overline{\overline{x+y}+z}$

Double negation $(x')' = x$

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

$A = x+y+z'$

Apply Boolean Properties $\boxed{x+x'=1}$

$A = x\cdot 1\cdot 1 + 1\cdot y\cdot 1 + 1\cdot 1\cdot z'$

$A = x\cdot(y+y')\cdot(z+z') + (x+x')\cdot(y)(z+z') + (x+x') + (y+y')($

$A = (xy+xy')(z+z') + (xy+x'y)\cdot(z+z') + (xz'+x'z')(y+y')$

$A = \underline{xyz} + xy'z' + \underline{xyz} + x'yz' + xyz' + x'y'z'$

Apply Boolean Property $\boxed{x+x=x}$

$A = xyz + xy'z' + x'yz' + xyz' + x'y'z'$