

Q1) Convert each of the following

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

sol

$$(101101.01)_2$$

$$(45.25)_{10} = (101101.01)_2$$

Q 0111111.1010 =  $(?)_{10}$

sol

$$0 \times 2 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^3 + 1 \times 2^4 + 1 \times 2^5 + 1 \times 2^6 + 1 \times 2^{-1} + 1 \times 2^{-2}$$

$$64 + 32 + 16 + 8 + 4 + 2 + 0.5 + 0.25$$

$$125 + 0.5 + 0.25$$

$$(125.625)_{10}$$

$$(0111111.1010)_2 = (125.625)_{10}$$

c)  $3A6F_{16} = (?)$

sol

<u>3</u>	<u>A</u>	<u>6</u>	<u>F</u>
0011	1010	0110	1111

Now Combining

$$(3A6F)_{16} = (0011 1010 0110 1111)$$

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

sol

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

$$\Rightarrow 128 + 32 + 8 + 2$$

$$\Rightarrow (170)_{10} \text{ ans}$$

$$-10/ = (-1)_2$$

sol

$$\begin{array}{r} -1 \\ -0001 \end{array}$$

$$-(0001)$$

$$\text{so } -(1)_{10} = -(0001)_2$$

2) Calculate

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

sol

$$\begin{array}{r} 9B_{16} \\ + 8A_{16} \end{array}$$

$$\Rightarrow (125)_{16} \text{ answer}$$

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

sol

$$\begin{array}{r} F7_{16} \\ - D6_{16} \end{array}$$

=

$$(21)_{16}$$

$$1100_2 + 1011_2$$

sol

$$\begin{array}{r} 1100_2 \\ + 1011_2 \end{array}$$

$$c) (1111)_2 \text{ ans}$$

$$d.) 156_{10} = (?)_{BCD}$$

sol

$$\begin{array}{ccc} 1 & 5 & 6 \\ \hline 0001 & 0101 & 0110 \end{array}$$

$$(0001 0101 0110)_{BCD}$$

Now

$$(156)_{10} = (0001 0101 1110)_{BCD}$$

$$e.) 1001010 = (?)_{gray}$$

sol

$$1001010$$

$$\begin{array}{ccccccc} 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \end{array}$$

$$1101111$$

so

$$(1001010)_{10} = (1101111)_{gray}$$

$$f.) \begin{array}{cccccccc} 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{array} \rightarrow \textcircled{1}$$

sol

$$\begin{array}{cccccccc} 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \end{array}$$

$\Rightarrow$

$$\Rightarrow 11111001 \rightarrow \textcircled{2}$$

d.)  $156_{10} = (?)_{BCD}$

sol

$$\begin{array}{ccc} 1 & 5 & 6 \\ \hline 0001 & 0101 & 0110 \end{array}$$

$(0001\ 0101\ 0110)_{BCD}$

Now

$(156)_{10} = (0001\ 0101\ 1110)_{BCD}$

e.)  $1001010 = (?)_{gray}$

sol

$1001010$

$1 \rightarrow 0 \rightarrow 0 \rightarrow 1 \rightarrow 0 \rightarrow 1 \rightarrow 0$

$1\ 1\ 0\ 1\ 1\ 1\ 1$

so

$(1001010)_{10} = (1101111)_{gray}$

f.)  $01111111 \rightarrow \textcircled{1}$   
 $00000111$

sol

$$\begin{array}{cccccc} 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \end{array}$$

$\rightarrow$

$\rightarrow 11111001 \rightarrow \textcircled{2}$

Now adding

0 1 1 1 1 1 1 1  
 1 1 1 1 1 0 0 1

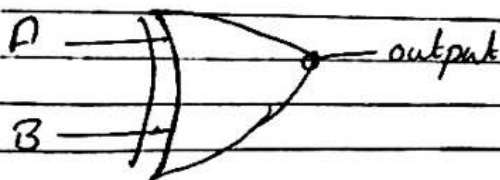
→

0 1 1 1 0 0 0 answer

23) XOR Gate =  $A \oplus B$   
 $\Rightarrow A + B (\bar{A}\bar{B})$  OR  
 $\Rightarrow AB + \bar{A}\bar{B}$



A	B	$A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0



A	B	$A \odot B$
0	0	1
0	1	0
1	0	0
1	1	1

T/O table

A	B	XOR	XNOR
1	0	1	0
1	1	0	1
0	1	1	0
0	0	0	1
1	0	1	0
0	1	1	0

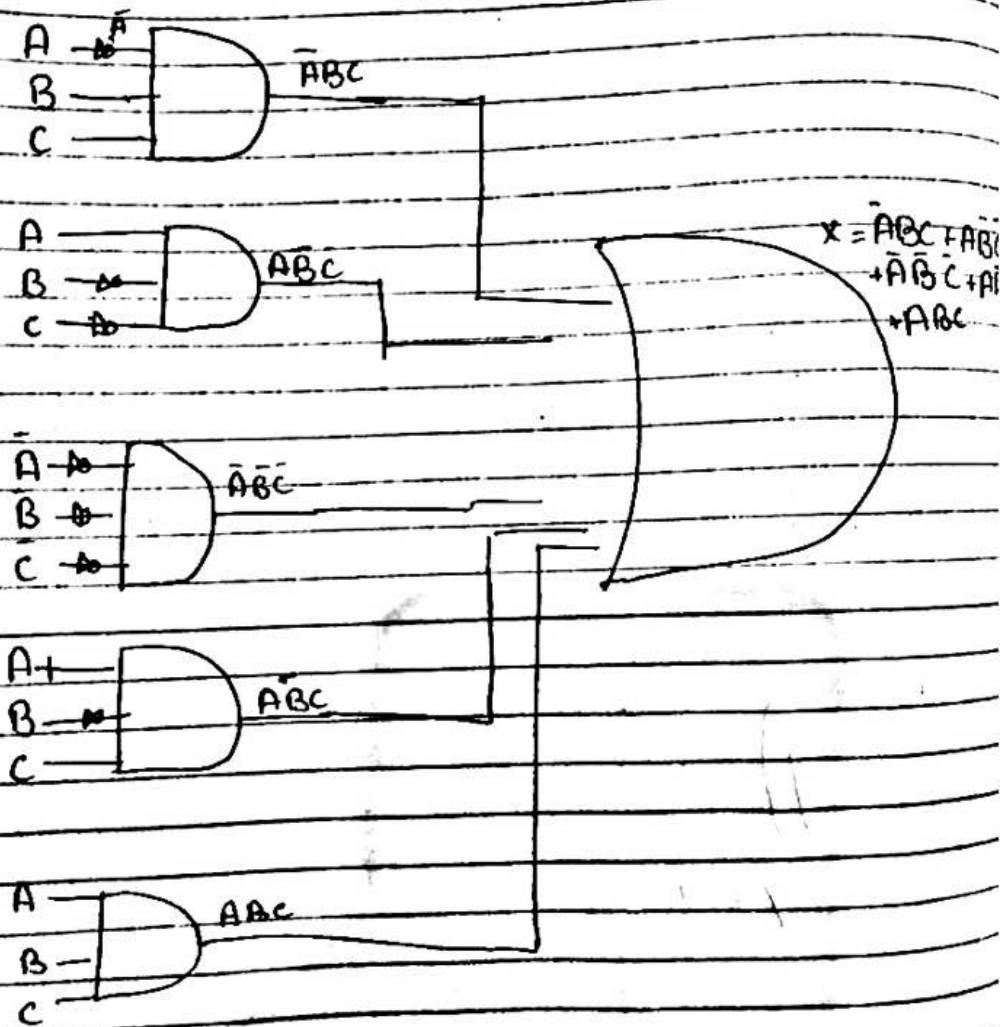
XOR

XNOR



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

sol



$$(ca) \quad A = \overline{x+y+z}$$

standard SOP form

$$A = \overline{(x+y)} + \overline{z}$$

$$\Rightarrow \overline{(x+y)} \overline{z}$$

Now as by applying demorgans law

$$\Rightarrow (\overline{x} \overline{y}) \overline{z}$$

$$A = \overline{x} \overline{z} + \overline{y} \overline{z} \quad \text{answer}$$

$$(Q5b) \quad A = \overline{xz} + \overline{yz}$$

sol

Demorgans law

$$(1) (\overline{xy})' = \overline{x' y'}$$

$$(2) (\overline{xy})' = \overline{x' + y'}$$

$$\Rightarrow (A') = (\overline{xz} + \overline{yz})'$$

$$A' = (\overline{xz})' (yz)'$$

$$A' = (\overline{x+z}) (\overline{y+z})$$

$$\Rightarrow \overline{x} \overline{y} + \overline{y} \overline{z} + \overline{x} \overline{z} + \overline{z} \overline{z}$$

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

again

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

$$A = (u'y')' (y'z)' (u'z)'$$

$$A = (u+y) (y+z) (u+z) \text{ answer.}$$

6a) — — —

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

$$000 \quad 100 \quad 010 \quad 110 \quad 111 \quad 101$$

$$X = \sum m(0, 2, 4, 5, 6, 7)$$

0	1	1	1	1	1
1				1	1

$$G_1 \rightarrow A$$

$$G_2 \rightarrow C$$

$$F \Rightarrow A + C$$



Part (B)

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

$$111 + 011 + 101 + 001 + 000 + 010$$

		AB			
		00	01	11	10
C	0	0	0	0	0
	1		0	0	

		AB		
		00	01	
C	0		0	$\rightarrow A+B+C$
	1	0	0	$\rightarrow A+B+\bar{C}$
	1		0	$\rightarrow A+\bar{B}+\bar{C}$
	0		0	$\rightarrow A+B+\bar{C}$