Comprehensive Assignment

Digital fundamental concept & Number Sys

Q1) Ans

→ Example of Analog:

old radio, land line.

→ Example of Both digital & Analog System:

- Digital Camera.

Digital camera like image Sensor of a digital camera is analog. On board analog to Digital converted converts image analog to digital.

→ Name of entire digital Systems

- Accumulator.

Q2) Sol)

Pulse width = 35 μs ⇒ 35×10^{-6} s

Time period = 210 μs ⇒ 210×10^{-6} s

$$F = \frac{1}{T} \Rightarrow \frac{1}{210 \times 10^{-6}} \Rightarrow 4761 \text{ MHz}$$

$$D.C = \frac{35 \times 10^{-6}}{210 \times 10^{-6}} \times 100\% \Rightarrow 16.67\%$$

Ans

Q3)

- Rise Time.
- Fall Time.
- Pulse width
- Amplitude.

Rise Time:

Rise time = 3 - 1 = 2ms

Fall Time:

$\Rightarrow$ 15.5 ms - 13.2 ms

$\Rightarrow$ 2.3 ms

PULSE WIDTH:

$\Rightarrow$ 14.4 - 2.2

$\Rightarrow$ 12.2 ms

Amplitude:

$\Rightarrow$ 5 V

Q4) List the octal and hexadecimal numbers from 8 to 64:

Octal	Hexadecimal	Octal	Hexadecimal
10	8	35	1D
11	9	36	1E
12	A	37	1F
13	B	40	20
14	C	41	21
15	D	42	22
16	E	43	23
17	F	44	24
20	10	45	25
21	11	46	26
22	12	47	27
23	13	50	28
24	14	51	29
25	15	52	2A
26	16	53	2B
27	17	54	2C
30	18	55	2D
31	19	56	2E
32	1A	57	2F
33	1B	60	30
34	1C	61	31

Octa	Hexadecimal
62	32
63	33
64	34
65	35
66	36
67	37
70	38
71	39
72	3A
73	3B
74	3C

Using A and B for the last two digits list numbers 4 to 32 in base 12.

Base 12: 4, 5, 6, 7, 8, 9, A, B, 10, 11, 12, 13
=> 14, 15, 16, 17, 18, 19, 1A, 1B, 20, 21
=> 22, 23,

Qs) A) 32K bytes => $32 \times 2^{10} = 32768$ bytes

B) 64M bytes => $64 \times 2^{20} = 67108864$ bytes

C) 6.4G bytes => $6.4 \times 2^{30} = 6871947674$ bytes

Q6) Convert the following

a) $(4230)_5 \Rightarrow 4\times5^3 + 2\times5^2 + 3\times5^1 + 0\times5^0$
$\Rightarrow 500 + 50 + 15 + 0$
$\Rightarrow \boxed{565_{10}}$

b) $(1A8)_{12} \Rightarrow 1\times12^2 + A\times12^1 + 8\times12^0$
$\Rightarrow 144 + 120 + 8$
$\Rightarrow \boxed{272_{10}}$

c) $(735)_8 \Rightarrow 7\times8^2 + 3\times8^1 + 5\times8^0$
$\Rightarrow 448 + 24 + 5$
$\Rightarrow \boxed{477_{10}}$

d) $(452)_6 \Rightarrow 4\times6^2 + 5\times6^1 + 2\times6^0$
$\Rightarrow 144 + 30 + 2$
$\Rightarrow \boxed{176_{10}}$

Q7) Ans)

Largest number of 16 bits

$(1111\ 1111\ 1111\ 1111)_2 \Rightarrow (65535)_{10}$

$\Rightarrow (FFFF)_{16}$

Q8) Ans)

a) base 6
b) base 8
c) base 11

Q9) Solution of Quadratic equation:

Sol

$x^2 - 11x + 22 = 0$, $x = 3$, $x = 6$

$(x-3)(x-6) = 0$

$x^2 - 9x + 18 = 0$

Working in base 8

Q10) Convert:

Hexa to binary:

7 3 D C$_{16}$

0111 0011 1101 1100$_2$

Binary to Octal:

0111 0011 1101 1100$_2$ => 73734$_8$

Q11) Conversions:

decimal to binary:

523_{10}

$\frac{523}{2}$ => 261.5 -> 0.5 x 2 => 1

$\frac{261}{5}$ => 130.5 -> 0.5 x 2 => 1

$\frac{130}{2}$ => 65 -> 0 x 2 => 0

$\frac{65}{2}$ => 32.5 -> 0.5 x 2 => 1

$\frac{32}{2}$ => 16 -> 0 x 2 => 0

$\frac{16}{2}$ => 8 -> 0 x 2 => 0

$\frac{8}{2}$ => 4 -> 0 x 2 => 0

$\frac{4}{2}$ => 2 -> 0 x 2 => 0

$\frac{2}{2}$ => 1 -> 0 x 2 = 0

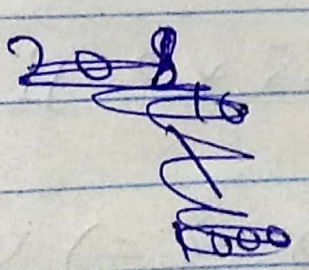
$\frac{1}{2}$ => 0.5 -> 0.5 x 2 = 1 => 1000001011

Convert decimal to Hexa and then Binary

$\frac{523_{10}}{16} \Rightarrow 32.6875 \rightarrow 0.6875 \times 16 \Rightarrow B$

$\frac{32}{16} \Rightarrow 2.0 \rightarrow 0 \times 16 \Rightarrow 0$

$\frac{2}{16} = 0.125 \rightarrow 0.125 \times 16 \Rightarrow 2$



$20B_{16}$

0010 0000 1011$_2$

Method B is faster

Q.12) 1) $(10110.0101)_2$

Sol

$\Rightarrow 1\times2^4+0\times2^3+1\times2^2+1\times2^1+0\times2^0+0\times2^{-1}+1\times2^{-2}+0\times2^{-3}+1\times2^{-4}$

$\Rightarrow 16+0+4+2+0+0+0.25+0+0.0625$

$\Rightarrow (22.3125)_{10}$

2) $(16.5)_{16}$ Sol

$\Rightarrow 1\times16^1+6\times16^0+0.5\times16^{-1}$

$\Rightarrow 16+6+0.03125$

$\Rightarrow (22.03125)_{10}$

3) $(26.24)_8$ Sol $\Rightarrow 2\times8^1+6\times8^0+2\times8^{-1}+4\times8^{-2}$

$\Rightarrow 16+6+0.25+0.0625$

$\Rightarrow (22.3125)_{10}$

4) $(DADA.B)_{16}$ Sol $\Rightarrow D\times16^3+A\times16^2+D\times16^1+A\times16^0+B\times16^{-1}$

$\Rightarrow 57344+2560+224+10+0.6875$

$\Rightarrow (60138.6875)_{10}$

5) $(1010.1101)_2$ Sol $1\times2^3+0\times2^2+1\times2^1+0\times2^0+1\times2^{-1}+1\times2^{-2}+0\times2^{-3}+1\times2^{-4}$

$\Rightarrow 8+0+2+0+0.5+0.25+0+0.0625$

$\Rightarrow (10.8125)_{10}$

Boolean Algebra & Logic Gate

Q13 Simplify:

(a) $ABC + \bar{A}B + AB\bar{C}$

Sol

$\Rightarrow ABC + AB\bar{C} + \bar{A}B$

$\Rightarrow AB(C + \bar{C}) + \bar{A}B$ $\quad \because (A + \bar{A} = 1)$

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

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

$\Rightarrow B$

(b) $\bar{X}YZ + XZ$

Sol

$\Rightarrow Z(\bar{X}Y + X)$ $\quad \because A + \bar{A}B = A + B$

$\Rightarrow Z(X + Y)$ $\quad \because$ DL

$\Rightarrow ZX + ZY$

(c) $\overline{(x+y)}(\bar{x} + \bar{y})$

Sol $\quad \because \overline{A+B} = \bar{A}\bar{B}$

$\Rightarrow \bar{x}\bar{y}(\bar{x} + \bar{y})$

$\Rightarrow \bar{x}\bar{y}\bar{x} + \bar{x}\bar{y}\bar{y}$ $\quad \because \bar{A} + \bar{A} = \bar{A}$

$\Rightarrow \bar{x}\bar{y} + \bar{x}\bar{y}$ $\quad \because \bar{A} + \bar{A} = \bar{A}$

$\Rightarrow \bar{x}\bar{y}$

d) $xy + x(wz + w\bar{z})$

Sol

$\Rightarrow xy + x[w(z + \bar{z})]$ $\quad \therefore A + \bar{A} = 1$

$\Rightarrow xy + x(w)$

$\Rightarrow xy + xw$

$\Rightarrow x(y + w)$

e) $(B\bar{C} + \bar{A}D)(A\bar{B} + C\bar{D})$ $\quad \therefore DL$

Sol

$B\bar{C}A\bar{B} + B\bar{C}C\bar{D} + \bar{A}DA\bar{B} + \bar{A}DC\bar{D}$

$A\bar{C}(B.\bar{B}) + B\bar{D}(\bar{C}.C) + \bar{A}\bar{B}D(\bar{A}.A) + \bar{A}C(D.\bar{D})$ $\quad \therefore A.\bar{A} = 0$

$0 + 0 + 0 + 0$

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

Sol

$\bar{A}.A + \bar{A}\bar{B} + \bar{A}\bar{C} + A\bar{C} + B\bar{C} + \bar{C}.\bar{C}$ $\quad \therefore A.\bar{A} = 0$, $\bar{A}.\bar{A} = \bar{A}$

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

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

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

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

Q14) $\bar{A}\bar{C} + ABC + A\bar{C}$

Sol

$\bar{C}(\bar{A}+A) + ABC$ $\quad \therefore \bar{A}+A = 1$

$\bar{C} + ABC$ $\quad \therefore A+1 = 1$

$\bar{C} + AB$

b) $(\overline{\bar{x}\bar{y}+z}) + \bar{z} + xy + wz$

Sol $\quad \therefore A+B = \bar{A}\bar{B}$

$(\bar{\bar{x}}\bar{\bar{y}} \cdot \bar{z}) + z + xy + wz$ $\quad \therefore \overline{AB} = \bar{A}+\bar{B}$

$(\bar{\bar{x}}+\bar{\bar{y}} \cdot \bar{z}) + z + xy + wz$ $\quad \therefore \bar{\bar{A}} = A$

$(x+y)\cdot\bar{z} + z + xy + wz$

$\bar{z}x + y\bar{z} + z + xy + wz$ $\quad \therefore A + \bar{A}B = A+B$

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

$z + x + y + xy + wz$ $\quad \therefore A + AB = A$

$x + y + z + wz$

$x + y + z$

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

Sol

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

$\bar{A}B\bar{D}+\bar{A}B\bar{C}+BA+BCD$

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

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

$AB+B\bar{D}+\bar{A}B\bar{C}+BCD$

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

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

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

$AB+B\bar{C}+B\bar{D}+BC$

$AB+B\bar{D}+B(\bar{C}+C)$ $\quad \therefore A+\bar{A}=1$

$AB+B\bar{D}+B$ $\quad \therefore A+AB=A$

$B+B\bar{D}$

$\boxed{B}$

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

Sol

$\therefore$ DL

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

$(\bar{A}\bar{A}+\bar{A}\bar{C}+\bar{A}C+C\cdot\bar{C})(A+B+\bar{C}D)$ $\quad \therefore A\cdot\bar{A}=0$

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

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

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

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

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

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

e) $AB\bar{C}D + \bar{A}BD + ABCD$

6/

$\Rightarrow ABD(\bar{C}+C) + \bar{A}BD$ $\quad \because A+\bar{A}=1$

$\Rightarrow ABD + \bar{A}BD$

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

$\Rightarrow BD$

Q15) $F = AB + CD$. find complement

$\bar{F} = \overline{AB + CD}$ $\quad \overline{A+B} = \bar{A}\,\bar{B}$

$\bar{F} = (\bar{A}\bar{B})(\bar{C}\bar{D})$ $\quad \overline{AB} = \bar{A} + \bar{B}$

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

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

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

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

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

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

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

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

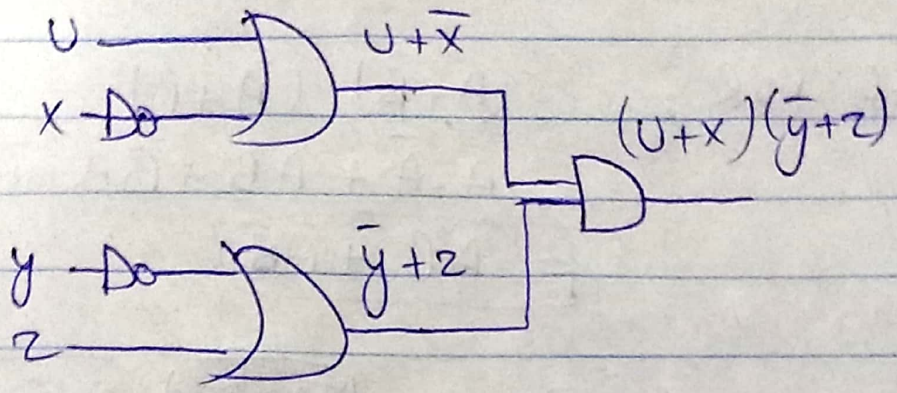
$\because A\bar{A} = 0$

$\Rightarrow 0$

Q16) Diagram

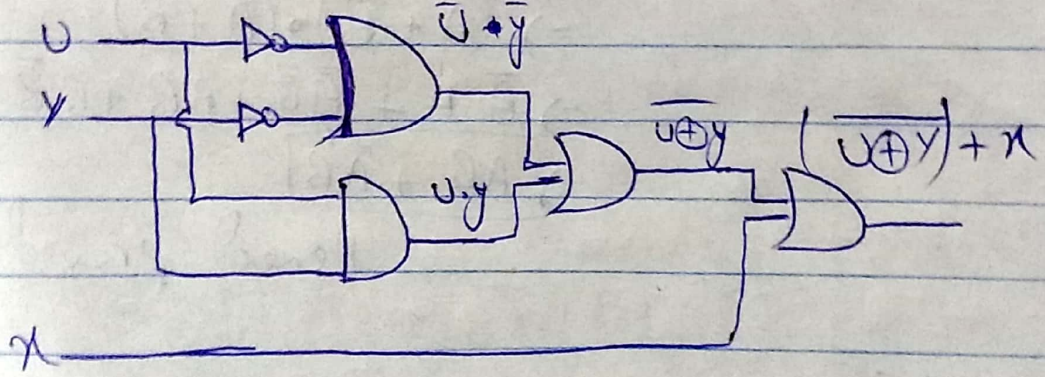
Sol

a) $A = \overline{[(U + \bar{X})(\bar{Y} + Z)]}$



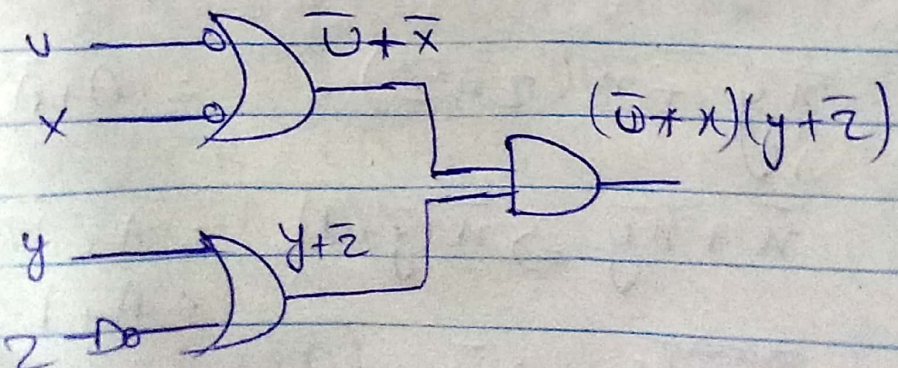
b) $B = (\overline{U \oplus X}) + X$

Sol



c) $C = (\bar{U} + \bar{X})(Y + \bar{Z})$

Sol



Q17 Sol

~~XOR : $x \oplus y = x\bar{y} + \bar{x}y$~~

XOR : $A \oplus B = A\bar{B} + \bar{A}B$

Dual of XOR : $= (A+\bar{B})(\bar{A}+B)$

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

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

Complement of XOR : $\Rightarrow \overline{A \oplus B}$

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

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

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

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

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

Hence proved

Q18 S.1 L.H.S

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

$\bar{x}\bar{y} + \bar{x}(z+\bar{z})$ $\quad \because A+\bar{A}=1$

$\bar{x} + \bar{x}\bar{y} \Rightarrow \bar{x}(\bar{y}+1)$ $\quad \because \bar{A}+\bar{A}\bar{B} = \bar{A}+\bar{B}$

$\because A+1 = 1$

~~$x \neq y$~~ $\Rightarrow \bar{x}$

R.H.S

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

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

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

Truth Table:

x	y	z	$\bar{x}$	$\bar{y}$	$\bar{z}$	$\bar{x} + \bar{y}\bar{z}$
0	0	0	1	1	1	1
0	0	1	1	1	0	1
0	1	0	1	0	1	1
0	1	1	1	0	0	1
1	0	0	0	1	1	1
1	0	1	0	1	0	0
1	1	0	0	0	1	0
1	1	1	0	0	0	0

Not Equal

Q20) $(B+D)(\bar{A}+\bar{B}+C)$

Sol

$\bar{A}B + B\bar{B} + BC + \bar{A}D + \bar{B}D + CD \quad \because A\bar{A}=0$

$\bar{A}B + BC + \bar{A}D + \bar{B}D + CD$ Ans

Q21) $\bar{A}B + \bar{A}\bar{C} + ABC$

Sol

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

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

$\because A+A=A$

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

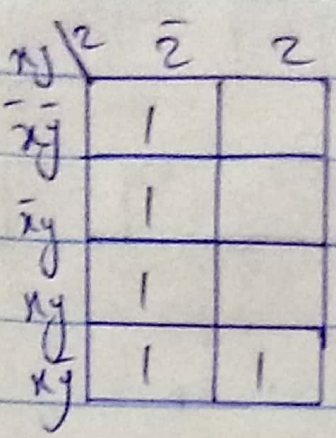
$011 \quad 010 \quad 001 \quad 111$

A	B	C	x	Sum Term
0	0	0	0	$A+B+C$
0	0	1	1	
0	1	0	1	
0	1	1	1	
1	0	0	0	$\bar{A}+B+C$
1	0	1	0	$\bar{A}+B+\bar{C}$
1	1	0	0	$\bar{A}+\bar{B}+C$
1	1	1	1	

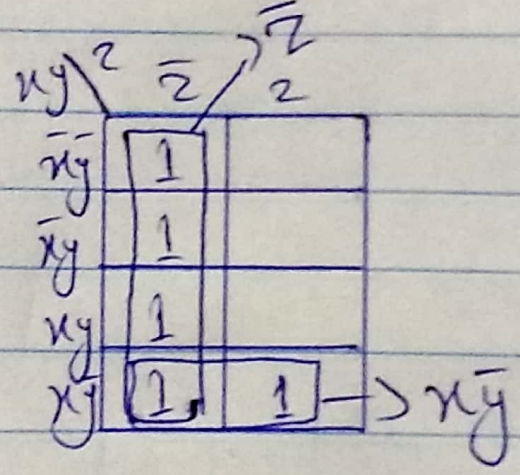
$(A+B+C)(\bar{A}+B+C)(\bar{A}+B+\bar{C})(\bar{A}+\bar{B}+C)$

Q22 a) $f(x,y,z) = \Sigma(0,2,4,5,6)$

Sol



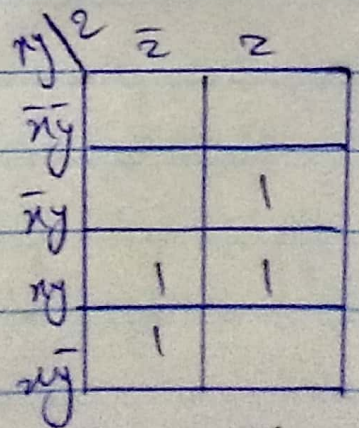
$\Rightarrow \bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + xy\bar{z} + x\bar{y}\bar{z} + x\bar{y}z$

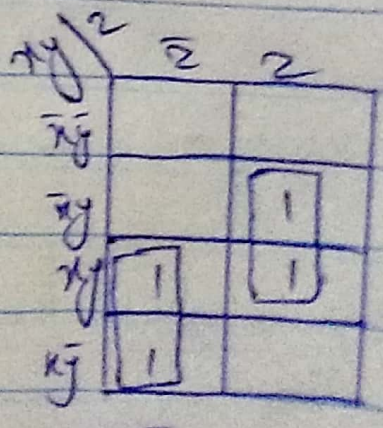


$\Rightarrow \bar{z} + x\bar{y}$

b) $f(x,y,z) = \Sigma(3,4,6,7)$

Sol





$\Rightarrow \bar{x}yz + x\bar{y}\bar{z} + xy\bar{z} + xyz$ $\Rightarrow x\bar{z} + yz$

c) $f(A,B,C) = \Sigma(1,2,3,5,7)$

Sol

AB \ C	$\bar{C}$	C
$\bar{A}\bar{B}$		1
$\bar{A}B$	1	1
AB		1
$A\bar{B}$		1

AB \ C	$\bar{C}$	C
$\bar{A}\bar{B}$		1
$\bar{A}B$	1	1
AB	1	1
$A\bar{B}$		1

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

d) $f(w,x,y,z) = \Sigma(0,1,2,4,5,6,8,9,12,13,14)$

Sol

wx \ yz	$\bar{y}\bar{z}$	$\bar{y}z$	yz	$y\bar{z}$
$\bar{w}\bar{x}$	1	1		1
$\bar{w}x$	1	1		1
wx	1	1		1
$w\bar{x}$	1	1		

wx \ yz	$\bar{y}\bar{z}$	$\bar{y}z$	yz	$y\bar{z}$
$\bar{w}\bar{x}$	1	1		1
$\bar{w}x$	1	1		1
wx	1	1		1
$w\bar{x}$	1	1		

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

$\Rightarrow \bar{w}\bar{x}\bar{y}\bar{z} + \bar{w}\bar{x}\bar{y}z + \bar{w}x\bar{y}\bar{z} + \bar{w}\bar{x}y\bar{z} + \bar{w}xy\bar{z} + wx\bar{y}z + wxy\bar{z} + w\bar{x}\bar{y}z + wxyz + w\bar{x}y\bar{z}$.

e) $F(A,B,C,D) = \Sigma(0,2,3,5,7,8,9,10,11,13,15$

Sol)

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1		1	1
$\bar{A}B$		1	1	
AB		1	1	
$A\bar{B}$	1	1	1	1

~~d)~~

$\Rightarrow \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BCD + AB\bar{C}D + ABCD + AB\bar{C}\bar{D} + AB\bar{C}D + A\bar{B}CD + A\bar{B}C\bar{D}$

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1		1	1
$\bar{A}B$		1	1	
AB		1	1	
$A\bar{B}$	1	1	1	1

$\Rightarrow A\bar{B} + \bar{B}\bar{D} + CD + BD$

Q23) a) $f(AB,CD) = \Sigma(0,1,2,5,8,9,10)$

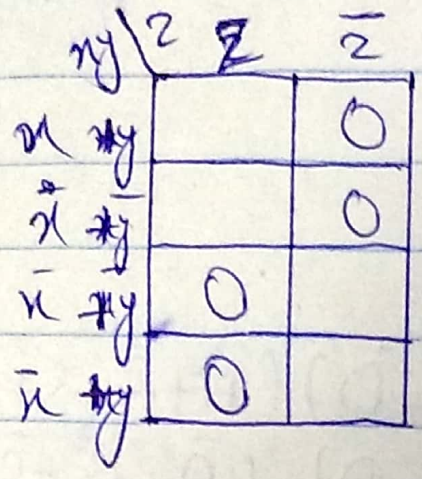
Sol

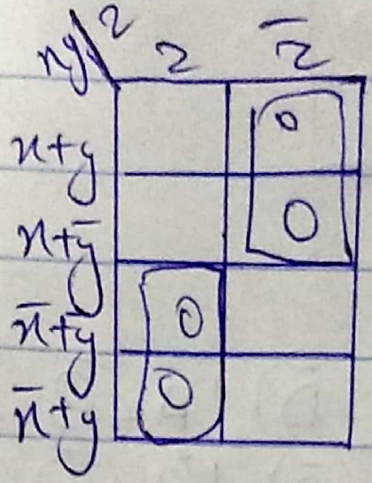
AB \ CD	$\bar{C}+\bar{D}$	$\bar{C}+D$	$C+D$	$C+\bar{D}$
$A+B$	0	0		0
$A+\bar{B}$		0		
$\bar{A}+\bar{B}$				
$\bar{A}+B$	0	0		0

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

b) $f(x,y,z) = \Sigma(1, 3, 4, 6)$

Sol



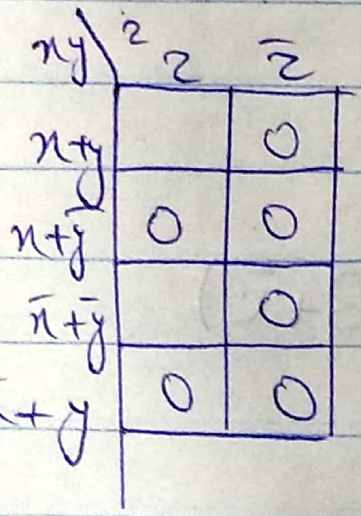


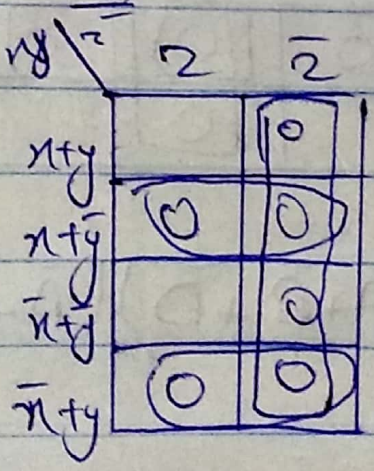
$\Rightarrow (x+\bar{z})(\bar{x}+z)$

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

c) $f(x,y,z) = \Sigma(1, 2, 3, 4, 5, 7)$

Sol





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

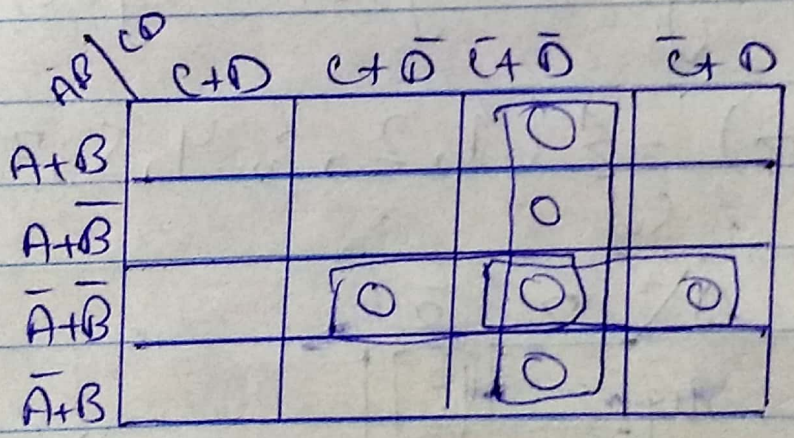
$\Rightarrow (x+y+\bar{z})(x+\bar{y}+z)(x+\bar{y}+\bar{z})(\bar{x}+\bar{y}+\bar{z})(\bar{x}+y+\bar{z})$
$(\bar{x}+y+z)$

d) $f(A,B,C,D) = \Sigma(3, 7, 11, 13, 14, 15)$

Sol

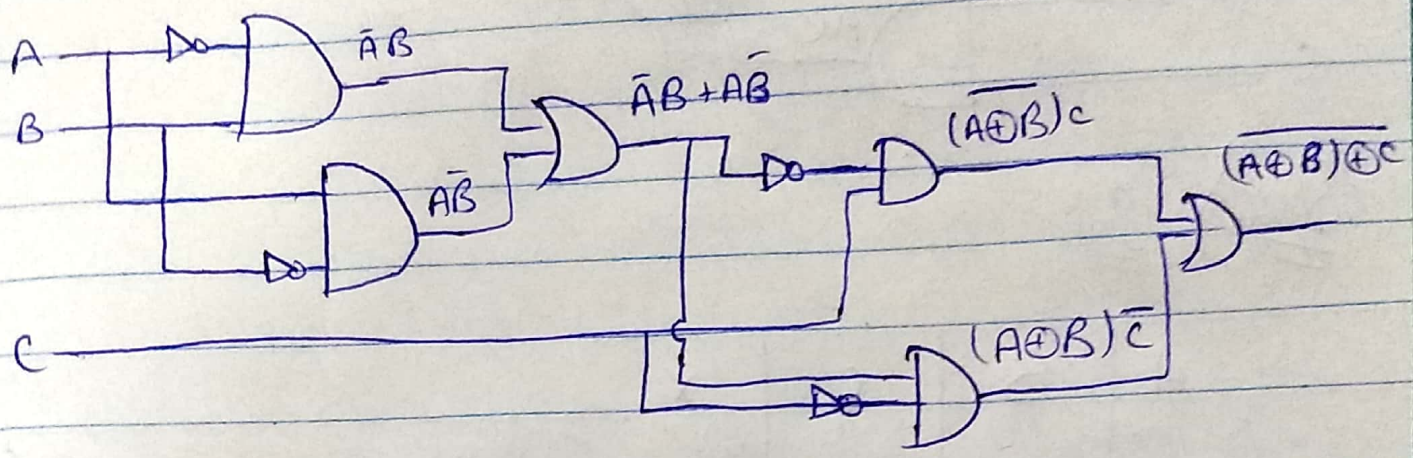
AB \ CD	C+D	C+D̄	C̄+D̄	C̄+D
A+B			0	
A+B̄			0	
Ā+B̄		0	0	0
Ā+B			0	

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



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

Q24 Construct: $\overline{(A \oplus B) \oplus C}$



Q25) Truth Table:

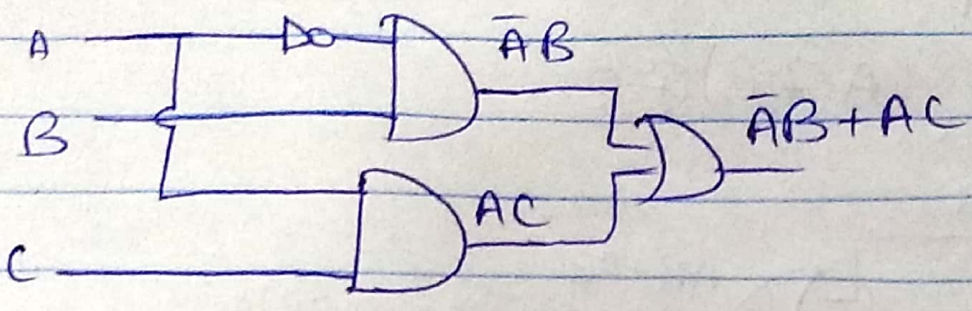
A	B	C	X	Product Term	Sum Term
0	0	0	0		$A+B+C$
0	0	1	0		$A+B+\bar{C}$
0	1	0	1	$\bar{A}B\bar{C}$	
0	1	1	1	$\bar{A}BC$	
1	0	0	0		$\bar{A}+B+C$
1	0	1	1	~~A+B~~ $A\bar{B}C$	
1	1	0	0		$\bar{A}+\bar{B}+C$
1	1	1	1	ABC	

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

$\Rightarrow \bar{A}B(\bar{C}+C) + A\bar{B}C + ABC \quad \because \bar{A}+A=1$

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

$\Rightarrow \bar{A}B + AC$

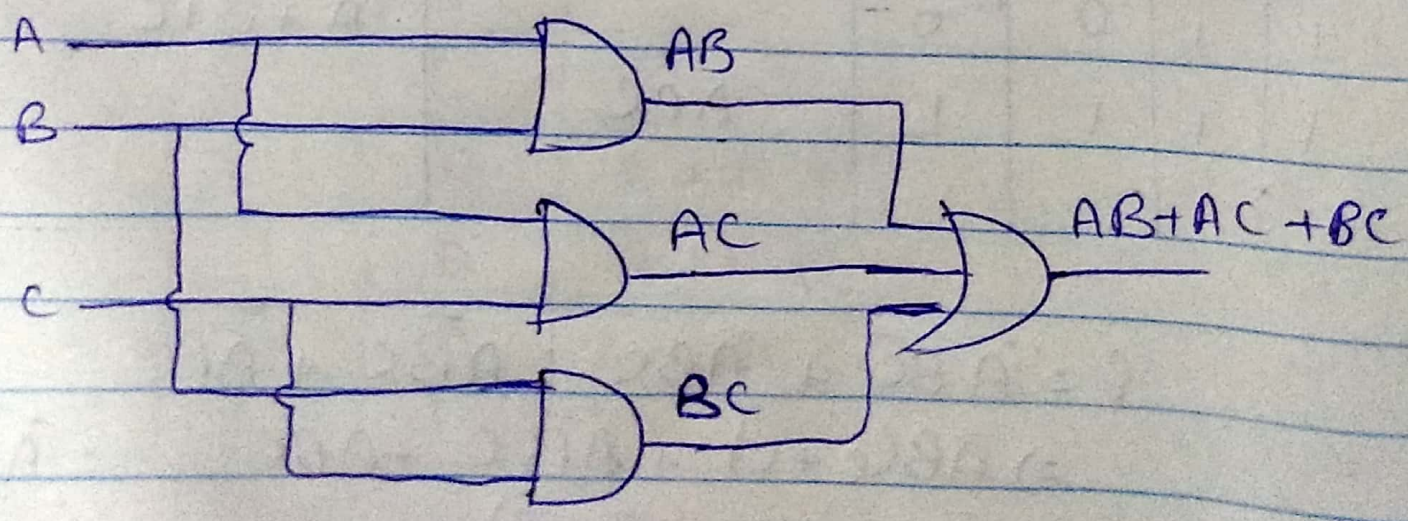


Q26) Sol

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

AB \ C	$\bar{C}$	C
$\bar{A}\bar{B}$	0	0
$\bar{A}B$	0	1
AB	1	1
$A\bar{B}$	0	1

$F = AB + AC + BC$



Q27 Sol

A) 01

Sol

$\Sigma = 1$, $C_{OUT} = 0$

B) 00

Sol

$\Sigma = 0$, $C_{OUT} = 0$

C) 10

Sol

$\Sigma = 1$, $C_{OUT} = 0$

D) 11

Sol

$\Sigma = 0$, $C_{OUT} = 1$

Q28 A+B)

$\Sigma = 0$, $C_{OUT} = 1$

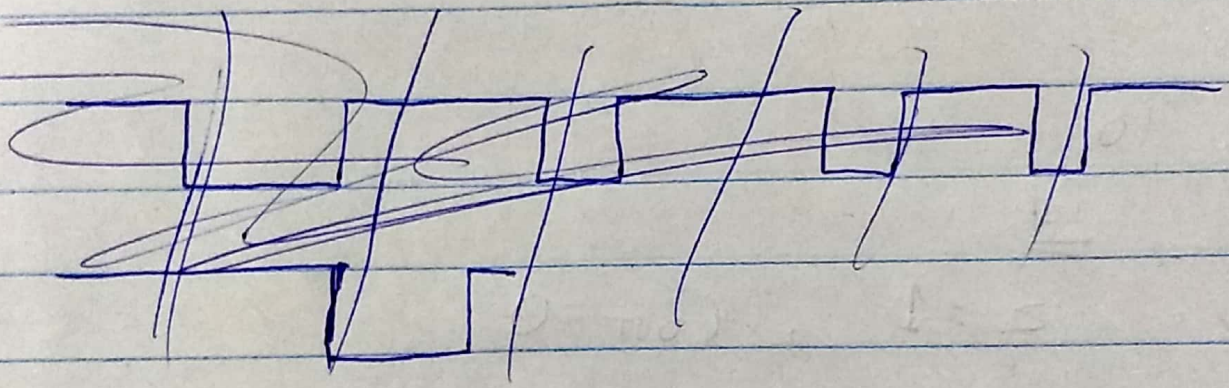
Q29 Ans

$$\begin{array}{r} 1\ 0\ 1\ 1 \\ 1\ 1\ 1\ 1 \\ \hline 1\ 1\ 0\ 1\ 1 \end{array} \quad \text{Carry} \leftarrow$$

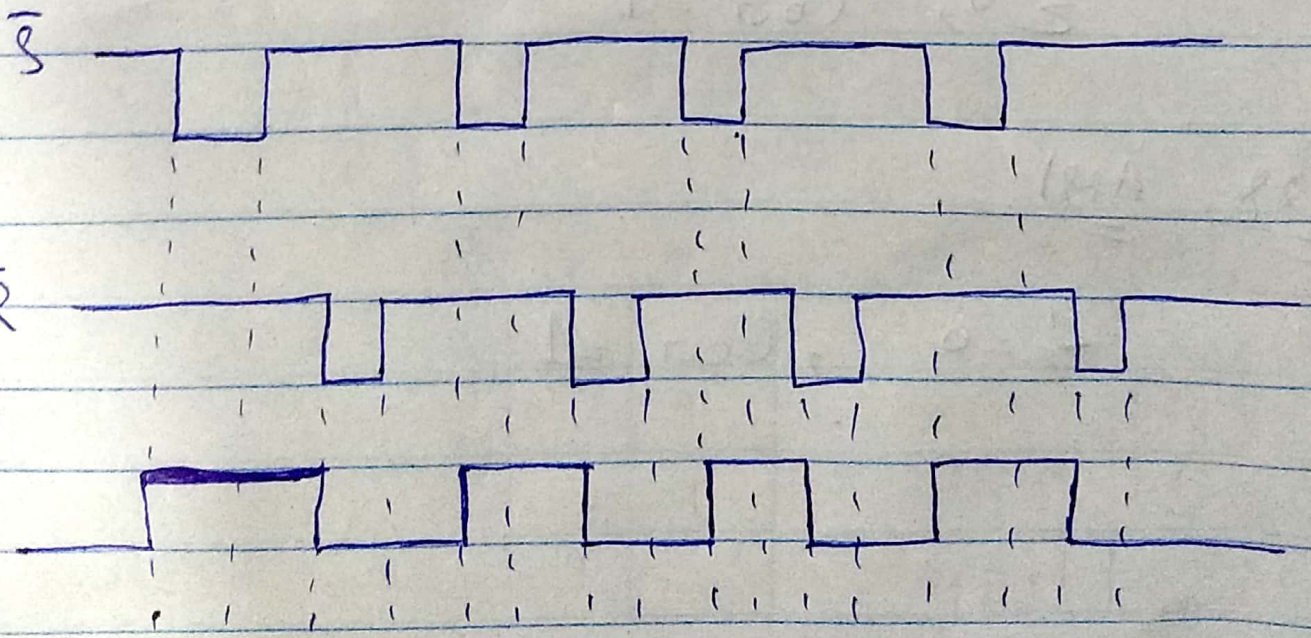
$E = 1011$, Carry $= 1$

Q30 Sol

a)



Q30 Ans



Q30 Sol