

$$\begin{array}{r} 72532 \rightarrow S \\ - 03250 \rightarrow M \\ \hline 69282 \end{array}$$

$$\begin{array}{r} R's \text{ complement of } M \text{ is } = 3250 \\ (10)^5 - 03250 \\ \hline = 96750 \end{array}$$

$$\begin{array}{r} 72532 \\ 96750 \\ \hline \boxed{+ 69282} \end{array}$$

$$(R_n)^k - n - 1$$

$$(R - 1)^5 \rightarrow 96749$$

$$\begin{array}{r} 72532 \\ + 96749 \\ \hline \end{array}$$

$$\begin{array}{r} \boxed{69281} \\ \uparrow \\ \boxed{+ 69282} \end{array}$$

$$b) \quad 03250 \rightarrow S$$

$$- 72532 \rightarrow M$$

$$R's \text{ com } 10^5 - 72532$$

$$27468$$

$$\therefore 03250$$

$$\begin{array}{r} + 27468 \\ \hline 30718 \end{array}$$

No carry

$$\therefore R's \text{ conv. } 10^5 - 30718$$

$$= 69282$$

$$A_1. \quad \boxed{- 69282}$$

# Tut-4

6.

$$A'BC + B'CD + AC + A'B'CD'$$

$$C [ \underline{A'B} + \underline{B'D} + \underline{A} + A'B'D' ]$$

$$C [ \underline{A+B} + \underline{B'D} + A'B'D' ]$$

$$C [ \underline{A+B} + B' [ \underline{AD} + A'D' ] ]$$

$$C [ \underline{A+B} + B' [ \underline{D+A} ] ]$$

$$C [ \underline{A+B} + \underline{B'D} + \underline{AB'} ]$$

$$C [ \underline{A+B'D} + \underline{A+B'+B+B'} ]$$

$$C \cdot 1 = C$$

b)

$$[ AB'(C+BD) + A'B' ] C$$

$$[ AB'C + \underline{AB'BD} + A'B' ] C$$

$$B' [ AC + A' ] C$$

$$B'C [ A' + C ]$$

$$A'B'C + B'C$$

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

$$(A+B)(A+B)$$

$$A + AB + B + A'B$$

$$A + B$$

$$7 a) A + A'B$$

$$A \cdot 1 + A'B$$

$$A \cdot (B+B') + A'B$$

$$AB + AB' + A'B$$

$$B \rightarrow AB' + B$$

$$A \cdot 1 + A'B$$

$$A \cdot (1+B) + A'B$$

$$A + AB + A'B$$

$$A + B + AB$$

$$A + B \cdot 1 = A + B$$

$$b) (A+B)(A+C)$$

$$A + AC + AB + BC$$

$$A + BC$$

$$c) A(A'+C)(A'B+C')$$

$$(A + AC)(A'B+C')$$

$$0 + 0 = 0$$

$$8i) \quad \begin{array}{l} \underline{AB + AB + AC + B + BC} \quad x + x + y \\ \underline{AB + AC + B + BC} \quad = x + y \\ \underline{B + B(C+A+B)} \end{array}$$

$$AC + BC + B$$

$$AC + B$$

$$ii) \quad \underline{ABC + A'B'C' + ABC' + A'BC}$$

$$\underline{BC + A'B'C' + ABC'}$$

$$B(C + A C') + A'B'C'$$

$$B(BC + A) + A'B'C'$$

$$\underline{BC + AB + A'B'C'}$$

DE

$$\overline{A+B} = \overline{A-B}$$

P.) C.

$$g) A + B(C + DE)'$$

$$A + B(C + D' + E')$$

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

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

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

$$d) (AB)' + A' + AB$$

$$(A' + B' + A' + AB)$$

$$AB(AB)'$$

$$AB(A' + B')$$

$$B + 0 = 0$$

$$e) f = A'B'C + BC'(A+A') + A'BC + ABC$$

$$\Rightarrow = A'B'C + ABC' + A'BC' + A'BC + ABC$$

$$f = A'B'C + BC' + A'BC + ABC$$

$$A'C + BC' + ABC$$

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

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

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

$$b) f = BC'D' + A'BD + ABD + BCD' + B'CD$$

$$+ A'B'C'D + AB'C'D$$

$$= BC'D' + BD + BCD' + B'CD$$

$$+ B'C'D$$

$$= BC'D' + BD + BCD' + B'D$$

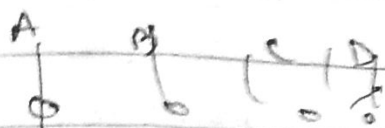
$$= \underline{BC'D'} + \underline{BCD'} + D$$

$$= BD' + D$$

$$= \underline{B + D}$$

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$$\begin{aligned}
 11. a) \quad F(A, B, C, D) &= D(A' + B) + B'D \\
 &= A'D + BD + B'D \\
 &= A'D + D \\
 &= D
 \end{aligned}$$



Min term  $\rightarrow m_0, m_2, m_4, m_6$   
 Max term  $\rightarrow M_1, M_3, M_5, M_7$   
 Sum of Product

$$\begin{aligned}
 \text{Min } F &= \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}\bar{C}D \\
 &\quad + A\bar{B}CD + AB\bar{C}D + ABCD
 \end{aligned}$$

Max

$$\begin{aligned}
 F &= (A+B+C+\bar{D}) \cdot (A+B+\bar{C}+\bar{D}) \cdot (A+\bar{B}+C+\bar{D}) \\
 &\quad (A+\bar{B}+\bar{C}+\bar{D}) \cdot (\bar{A}+B+C+\bar{D}) (\bar{A}+B+\bar{C}+\bar{D}) \\
 &\quad (\bar{A}+\bar{B}+C+\bar{D}) \cdot (\bar{A}+\bar{B}+\bar{C}+\bar{D})
 \end{aligned}$$

$$\overline{A+B} = \overline{A} \cdot \overline{B}$$

12. a)  $f(x, y, z) = \pi M(0, 1, 4, 5)$

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

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

$$= 0 + 0 + 0 + 0 + xy + xy\bar{z} + 0 + xyz + xy + x\bar{z} + xy\bar{z} + xy\bar{z} + \bar{x}y + \bar{x}yz + y + y\bar{z} + yz + \bar{x}y\bar{z} + \bar{z}$$

$$= y + xy + \bar{x}y$$

$$= y$$

13. a)  $F = ac' + ace + ace' + acd' + ad'e'$

$$F = ac' + ac + a'cd' + a'd'e'$$

$$F = a + a'cd' + a'd'e'$$

$$F = a + cd' + a'd'e'$$

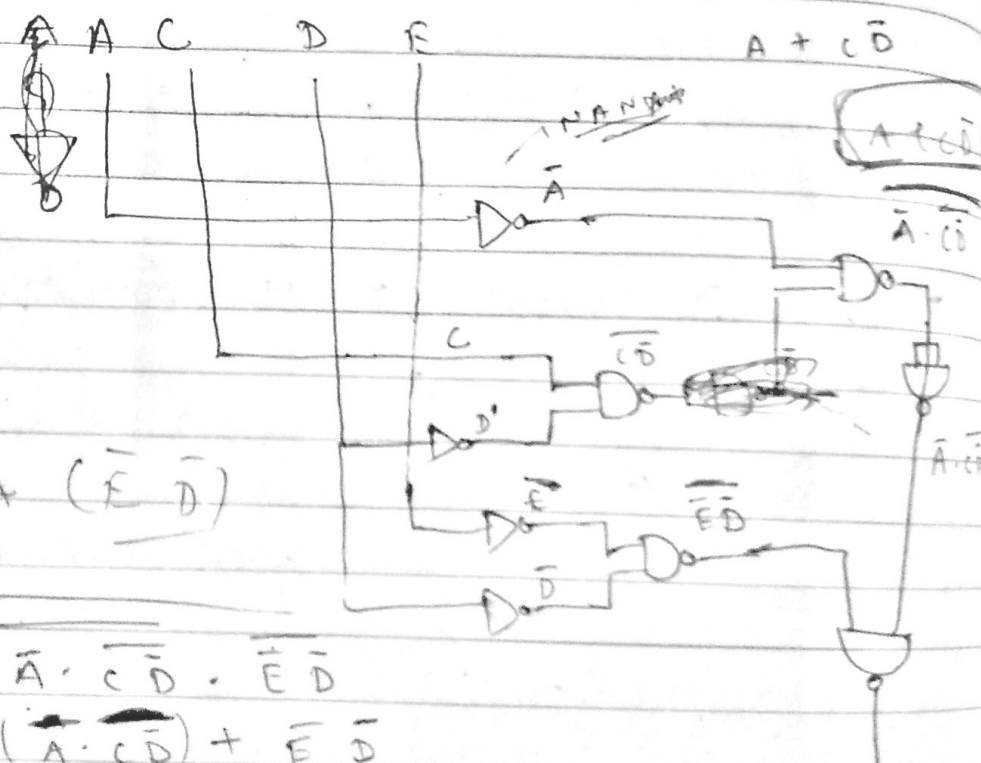
$$F = cd' + a + d'e'$$

$$a + cd' + d'e'$$

$$=$$

$$\overline{A \cdot C \bar{D}}$$

$$\overline{a + cd' + d'e'}$$



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

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

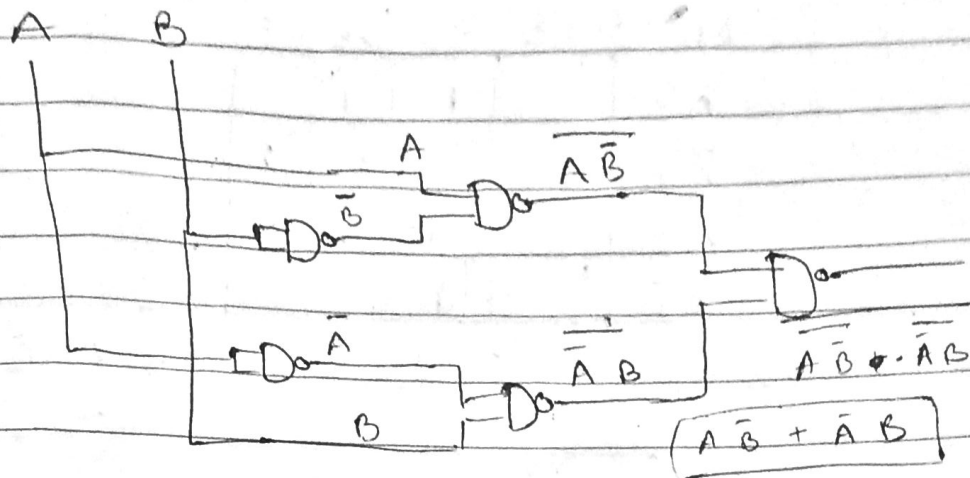
$$\overline{A \cdot C \bar{D} \cdot E \bar{D}}$$

$$= (\overline{A \cdot C \bar{D}}) + E \bar{D}$$

$$= A + C \bar{D} + E \bar{D}$$



b)  $F = AB' + A'B$



15.  $f(A, B, C, D) = \sum (A'BC + B'CD + AC + A'B'CD)$

Min term  $\rightarrow m_6, m_7, m_3, m_{11}$

$m_{10}, m_{11}, m_{14}, m_{15}, m_2$

AB \ CD	00	01	11	10
00	0	0	1	1
01	0	0	1	1
11	0	0	1	1
10	0	0	1	1

C

011-  
9 12 1

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11)  $f(A, B, C, D) = ABC + BCD + AC + BC$

AB \ CD	00	01	11	10
00	0	0	0	0
01	0	0	1	1
11	0	0	1	1
10	0	0	1	1

BC + AC

$(A + C\overline{D}) \cdot (\overline{E} \overline{D})$

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

16 a)  $A, B, C, D = m(1, 3, 6, 3, 5, 13, 14, 15)$

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

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

b)  $w, x, y, z$

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

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

12 a)

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

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

b)

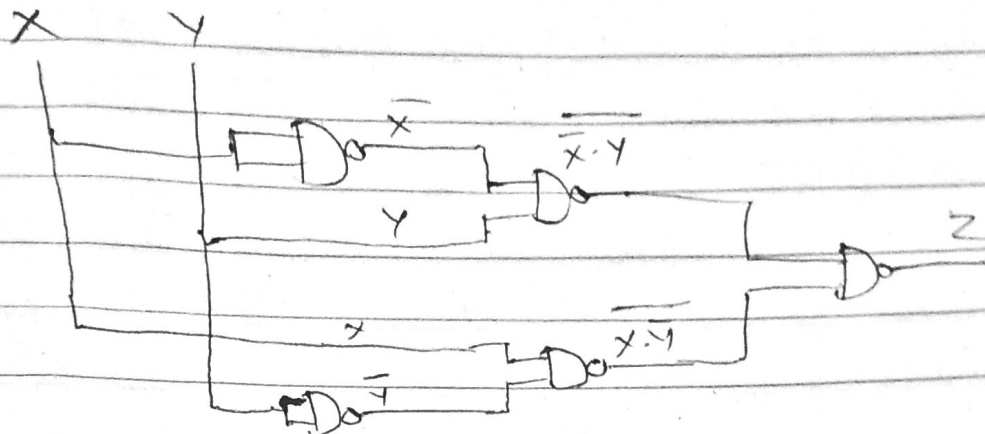
$AB \backslash CD$	$\bar{C}+D$	$C+\bar{D}$	$\bar{C}+\bar{D}$	$\bar{C}+D$
$A+B$	0	0	0	0
$A+\bar{B}$	0		0	
$\bar{A}+B$	0		0	0
$\bar{A}+\bar{B}$	0		0	

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



14 a) XOR,  $z = \bar{x}y + x\bar{y}$

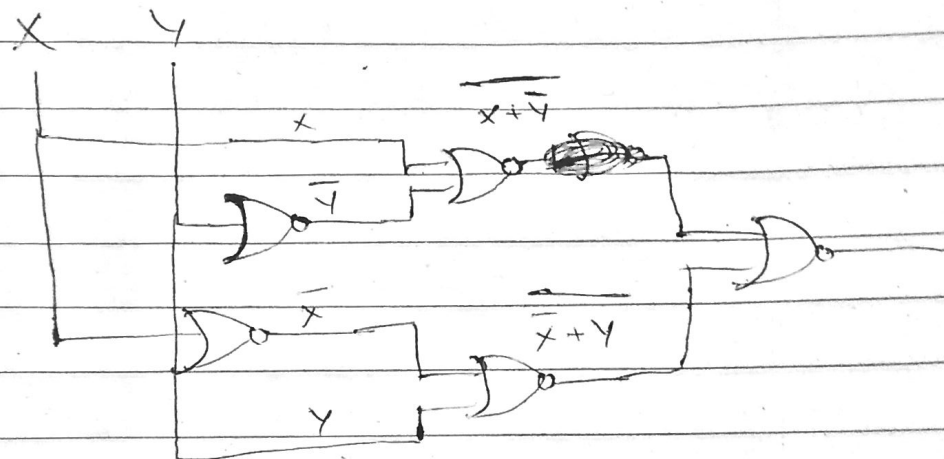
$x \oplus y$



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

b) X NOR,  $z = (x + \bar{y}) \cdot (\bar{x} + y)$

$x \odot y$



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

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

$$\begin{aligned} \overline{(\bar{A}B + A + AB)} &= \overline{(\bar{A} + \bar{B} + A + AB)} \\ &= \overline{(\bar{A} + \bar{B} + AB)} \\ &= \overline{(\bar{A} + B + B)} \\ &= \overline{(1)} = 0 \end{aligned}$$

(12)  $F(x, y, z) = \sum m(0, 1, 4, 5)$

	x	y	z	MAXTERM
0	0	0	0	0
1	0	0	1	0
2	0	1	0	1
3	0	1	1	1
4	1	0	0	0
5	1	0	1	0
6	1	1	0	1
7	1	1	1	1

$m_2 * m_3 = m_6 * m_7$

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

(6)

	A	B	C	D	MAXTERM
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	1
9	1	0	0	1	1
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	1
13	1	1	0	1	1

14	1	1	1	0	-
15	1	1	1	1	-

$$\begin{aligned}
 & (A + \bar{B} + C + \bar{D}) \cdot (A + \bar{B} + \bar{C} + D) * (A + \bar{B} + \bar{C} + \bar{D}) \\
 & (\bar{A} + B + C + D) \cdot (\bar{A} + B + C + \bar{D}) \cdot (\bar{A} + \bar{B} + C + D) \\
 & (\bar{A} + \bar{B} + C + \bar{D}) \cdot (\bar{A} + \bar{B} + \bar{C} + D) \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D})
 \end{aligned}$$