Tutorial-1

Solutions

Ans 1.

Ans 1

(a) $X = (\overline{\bar{A}\bar{B} + AB})\bar{C} + (\bar{A}\bar{B} + AB)C$

$X = (\overline{\bar{A}\bar{B}} \cdot \overline{AB})\bar{C} + \bar{A}\bar{B}C + ABC$

$X = [(A+B)\cdot(\bar{A}+\bar{B})]\bar{C} + \bar{A}\bar{B}C + ABC$

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

$X = \Sigma m(100, 010, 001, 111)$

$X = \Sigma m(1, 2, 4, 7)$

$\boxed{Y = AB + BC + CA}$

(b)

A	B	C	X	Y
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Ans

Ans 2.

B and C are in parallel hence equivalent to OR Gate i.e., B+C

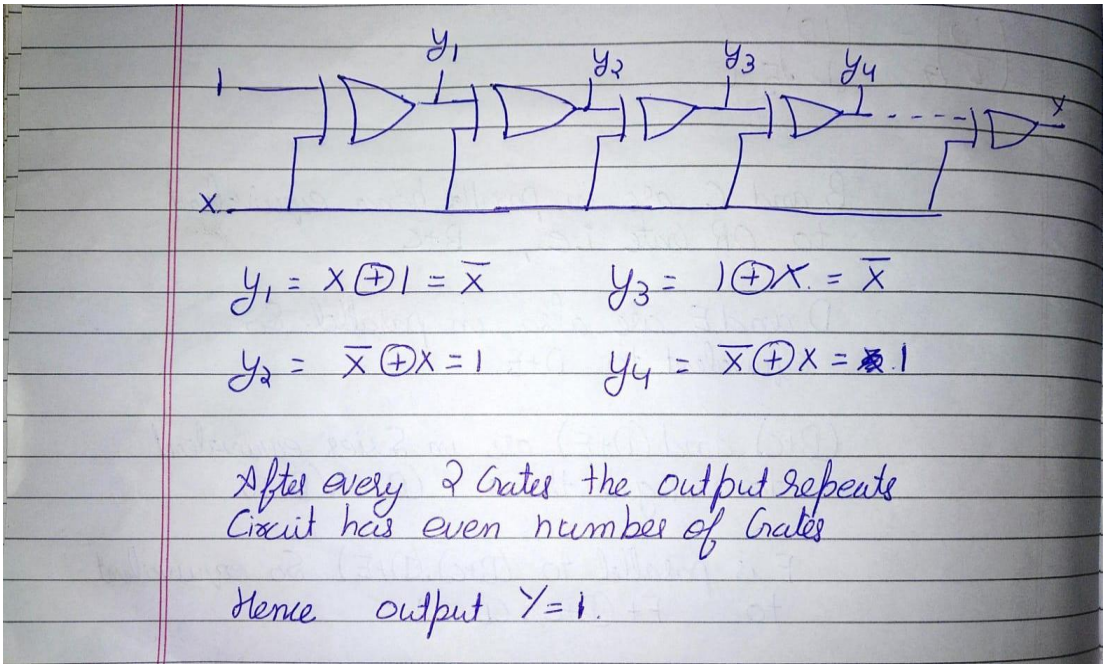
D and E are also in parallel. So. equivalent to D+E.

(B+C) and (D+E) are in Series equivalent to and gate that is. (B+C).(D+E)

F is parallel to (B+C).(D+E) So equivalent to F+(B+C).(D+E)

A is in Series So equivalent to.
$Y = A.[F + (B+C).(D+E)]$

Ans 3.



$y_1 = X \oplus 1 = \overline{X}$ $y_3 = 1 \oplus X = \overline{X}$

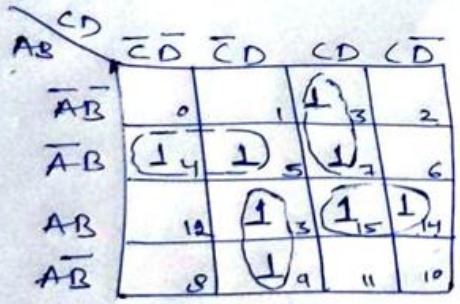
$y_2 = \overline{X} \oplus X = 1$ $y_4 = \overline{X} \oplus X = 1$

After every 2 Gates the output repeats
Circuit has even number of Gates

Hence output $Y = 1$.

Ans 4.

$f(A,B,C,D) = \Sigma m(3,4,5,7,9,13,14,15)$



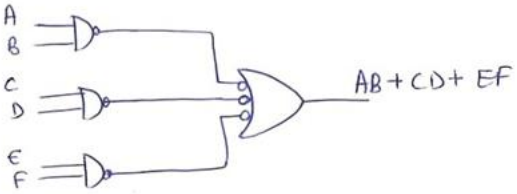
Note : quad is not in the reduced form

$f \Rightarrow \bar{A}B\bar{C} + \bar{A}CD + A\bar{C}D + ABC$

Ans 5.

(a) $W = AB + CD + EF$

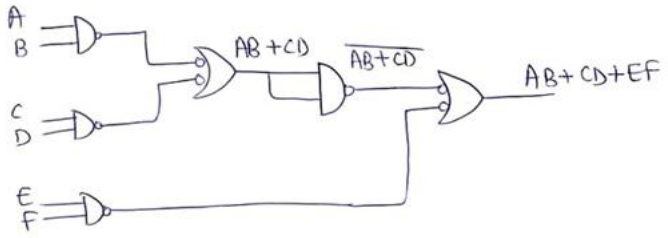
(i) using NAND gates of any size.



Total gates ⇒ 4

((3) 2-input NAND gates + (1) 3-i/p NAND gates)

(ii) using 2-i/p NAND gates only.



Total gates ⇒ 6