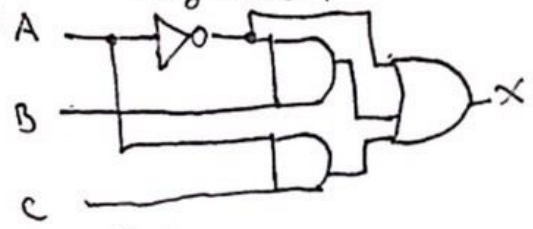
Yohandi - 120040025

EIE2050 Assignment 4

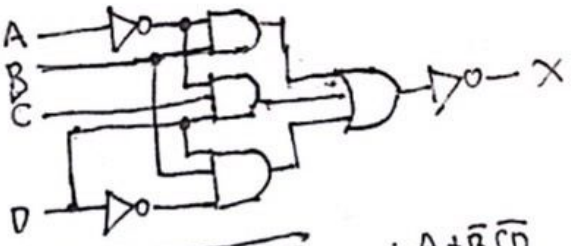
1(a)



$X = \bar{A} + \bar{A}B + AC$

$= \bar{A} + AC$

(b)



$X = \overline{\bar{A}B + \bar{A}CD + BD\bar{D}}$

$= \overline{\bar{A}(B + CD)}$

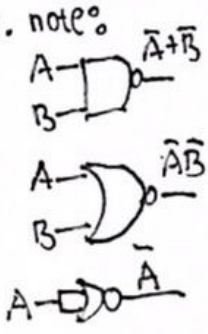
$= A + (\overline{B + CD})$

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

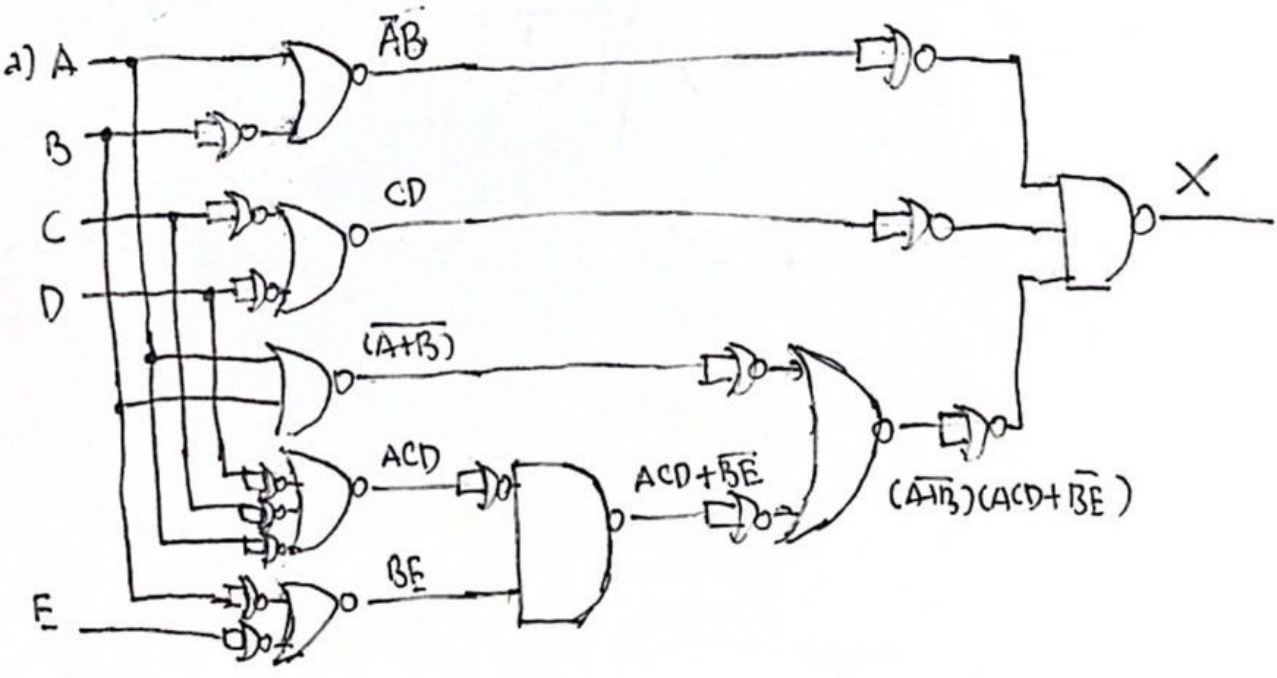
$= A + \bar{B}(\bar{C} + \bar{D})$

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

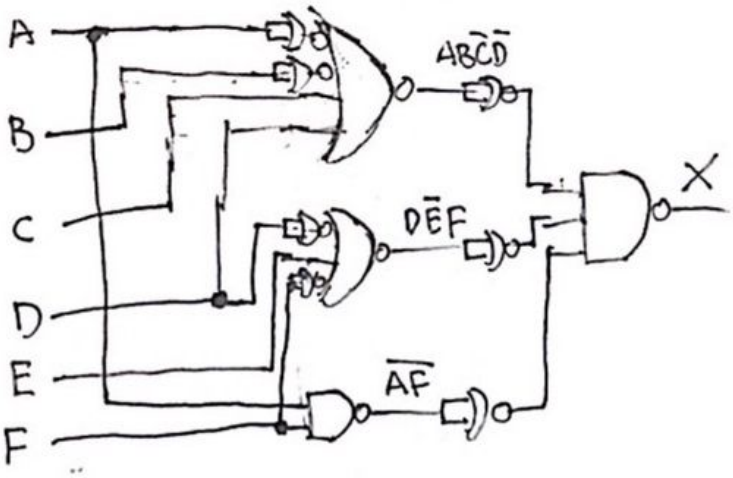
2. note:



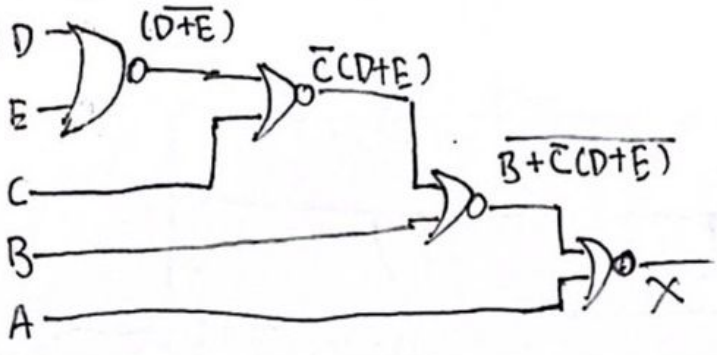
a)



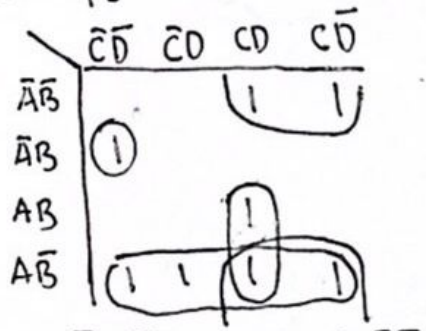
b)



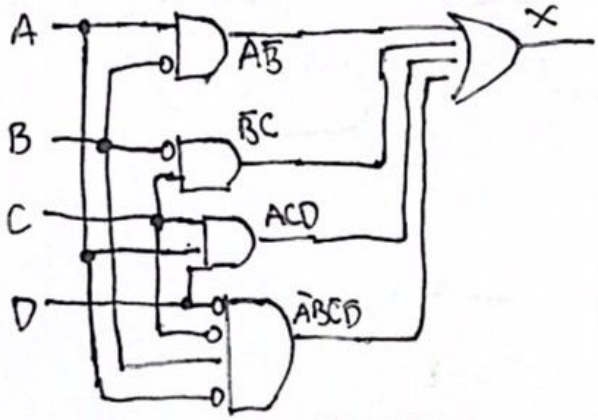
c)



3. K-map,



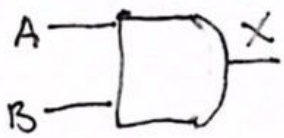
$X = A\bar{B} + \bar{B}\bar{C} + ACD + \bar{A}B\bar{C}\bar{D}$



4a) $X = AB + ABC$

$= AB(1+C)$

$= AB$



A	B	C	AB	ABC	AB + ABC
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	1	0	1
1	1	1	1	1	1

identical

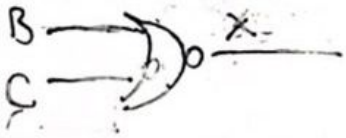
b) $X = \overline{(\overline{(AB)}\cdot\overline{(B+C)})} + C$

$= (\overline{AB})(\overline{B+C})\,\bar{C}$

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

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

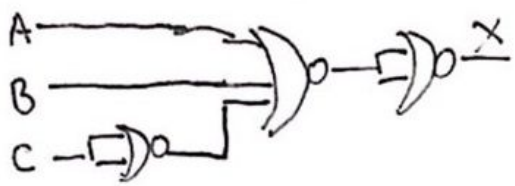
$= \bar{B}\bar{C}$



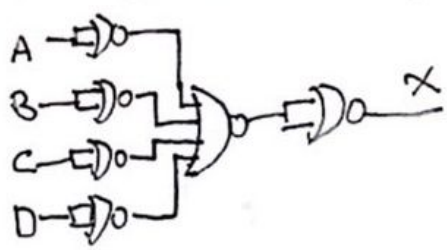
A	B	C	AB	$\bar{B}\bar{C}$	B+C	$\overline{(\overline{AB}\times\overline{B+C})} + C$
0	0	0	0	1	0	1
0	0	1	0	0	1	0
0	1	0	0	0	1	0
0	1	1	0	0	1	0
1	0	0	0	1	0	1
1	0	1	0	0	1	0
1	1	0	1	0	1	0
1	1	1	1	0	1	0

identical

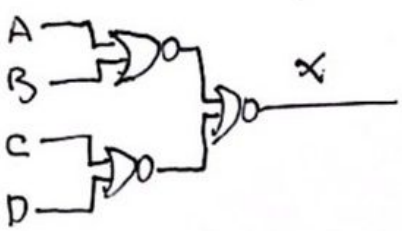
5(d) $X = A + B + \bar{C} = \overline{(\overline{A+B+\bar{C}})}$



(e) $X = \overline{A\bar{B}} + C\bar{D} = \overline{(\overline{A+\bar{B}})+(\bar{C}+D)}$



(f) $X = (A+B)(C+D) = \overline{(\overline{A+B})+(\overline{C+D})}$

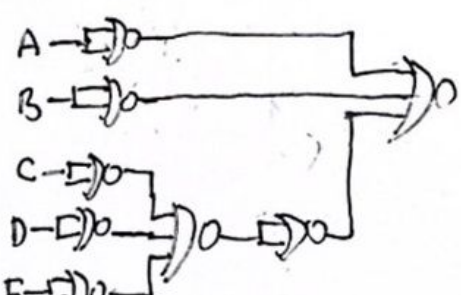


(g) $X = AB[C(\overline{DE}+\overline{AB}) + B\overline{CE}]$

$= \overline{A\bar{B} + (C(\overline{DE}+\overline{AB})(B+C+E))}$

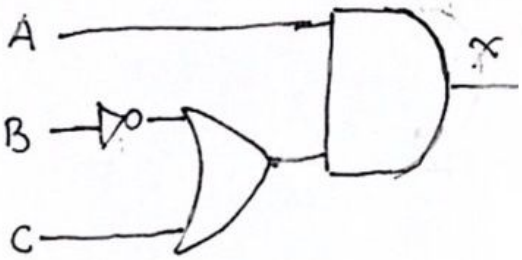
$= \overline{A\bar{B} + (\overline{A+\bar{B}+\bar{C}+\bar{D}+\bar{E}})}$

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



6. K-map, $\bar{C}$ C

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



$X = AC + A\bar{B} = A(\bar{B} + C)$

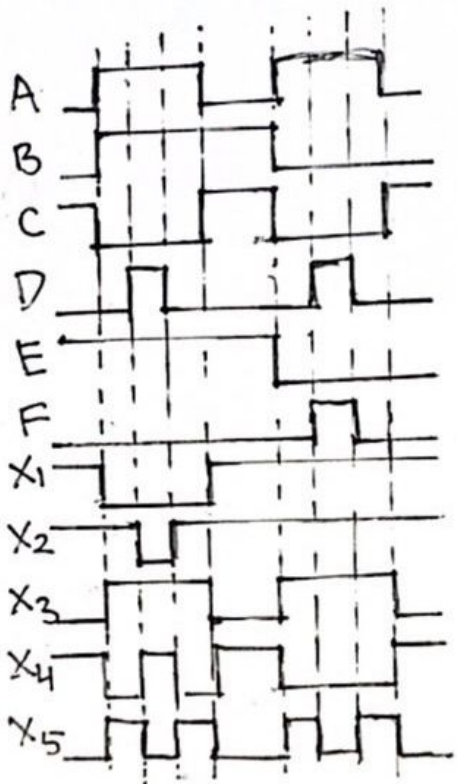
7. $X_1 = \bar{A} + \bar{B} = \overline{AB}$

$X_2 = \bar{D} + \bar{E} = \overline{DE}$

$X_3 = \overline{X_1 \cdot C}$

$X_4 = \overline{X_3} + \overline{X_2} = \overline{X_2 \cdot X_3}$

$X_5 = \overline{X_4 + F}$

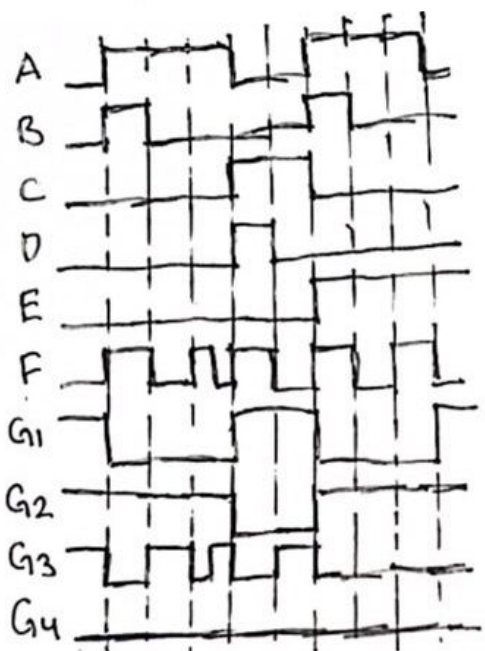


9. $G_1 = \bar{A}\bar{B} = \overline{(A+B)}$

$G_2 = \bar{C}\bar{D} = \overline{(C+D)}$

$G_3 = \bar{E}\bar{F} = \overline{(E+F)}$

$G_4 = \overline{G_1 + G_2 + G_3}$



G_4 doesn't match the observed output. By focusing on the intermediate output, it can be found that G_2 is faulty. We can make G_2 gate Low so that when output is high, gate will give faulty output, undershorted.