ödev - 3

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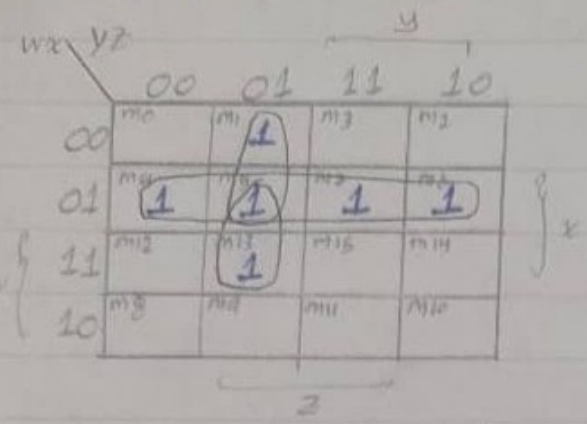
20290036.

Q1.

(a) $F(w,x,y,z) = \Sigma(1,4,5,6,7,13)$

$m_1, m_4, m_5, m_6, m_7, m_{13}$



$F = (w'x'y'z + w'xy'z') + (w'xy'z' + w'xy'z + w'xyz + w'xyz') + (w'xy'z + wxy'z)$

$F = (w'y'z) + (w'x) + (xy'z)$

$\boxed{F = w'y'z + w'x + xy'z}$

(b)

$F(w,x,y,z) = \Sigma(0,1,5,8,9)$

$F = (\bar{w}\bar{x}\bar{y}\bar{z} + \bar{w}\bar{x}\bar{y}z + w\bar{x}\bar{y}\bar{z} + w\bar{x}\bar{y}z) + (\bar{w}\bar{x}\bar{y}z + \bar{w}x\bar{y}z)$

$F = (\bar{x}\bar{y}) + (\bar{w}\bar{y}z)$

$\boxed{F = \bar{x}\bar{y} + \bar{w}\bar{y}z}$

Q2. (a) $wyz + \bar{w}\bar{x} + wx\bar{z}$ → $(x+\bar{x})$, $(y+\bar{y})\cdot(z+\bar{z})$, $(y+\bar{y})$

wx \ yz	00	01	11	10
00	0: 1	1: 1	3: 1	2
01	4	5	7	6
11	12: 1	13	15: 1	14: 1
10	8	9	11: 1	10: 1

~~$F = wxyz\bar{z} + w$~~

$F = w\bar{x}yz + wxyz + \bar{w}\bar{x}yz + w\bar{x}y\bar{z} + \bar{w}\bar{x}\bar{y}\bar{z} + \bar{w}\bar{x}\bar{y}z + \bar{w}x\bar{y}\bar{z} + wx\bar{y}\bar{z}$

$F = \Sigma(0, 1, 3, 10, 11, 12, 14, 15)$

(b) $A'B + A'CD + B'CD + BC'D'$ → $(C+C')\cdot(D+D')$, $(B+B')$, $(A+\bar{A})$ → $1(A+\bar{A})$

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

AB \ CD	00	01	11	10
00	0	1	3: 1	2
01	4: 1	5: 1	7: 1	6: 1
11	12: 1	13	15	14
10	8	9	11: 1	10

$F = \Sigma(3, 4, 5, 6, 7, 11, 12)$

Q3. (a) $F(w, x, y, z) = \Sigma(0, 1, 2, 5, 8, 10, 13)$ POS

wx \ yz	00	01	11	10
00	0: 1	1: 1	3: 0	2: 1
01	4: 0	5: 1	7: 0	6: 0
11	12: 0	13: 1	5: 0	14: 0
10	8: 1	9: 0	11: 0	10: 1

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

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

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

(b) $F(A, B, C, D) = \Pi(1, 3, 6, 9, 11, 12, 14)$

AB \ CD	00	01	11	10
00	0: 1	1: 0	3: 0	2: 1
01	4: 1	5: 1	7: 1	6: 0
11	12: 0	13: 1	15: 1	14: 0
10	8: 1	9: 0	11: 0	10: 1

$\bar{B}C\bar{D}$, $AB\bar{D}$, $\bar{B}C$

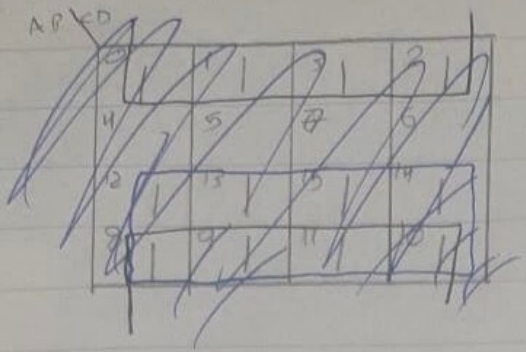
$F = (\bar{B}D + BC\bar{D} + AB\bar{D})'$

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

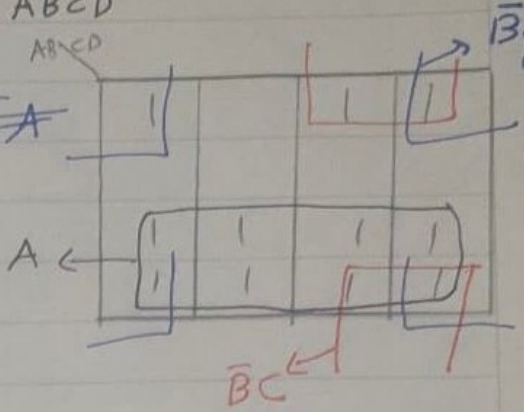
Q4. (a) $F(A,B,C,D) = \bar{A}\bar{B}C + A\bar{C} + ACD + A\bar{C}\bar{D} + \bar{A}\bar{B}\bar{D}$

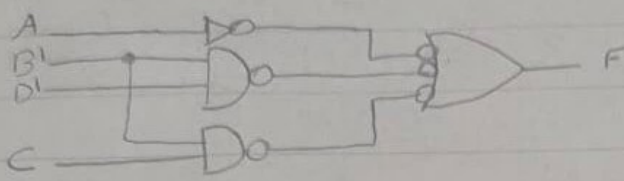
$(D+\bar{D})$ $(B+\bar{B})\cdot(D+\bar{D})$ $(B+\bar{B})$ $(C+\bar{C})$

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



$F = \bar{B} + A$



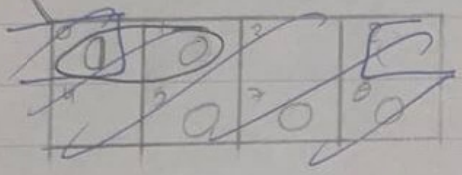


$F = A + \bar{B}\bar{D} + \bar{B}\bar{C}$

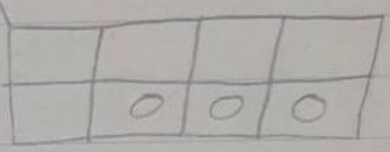
(b)

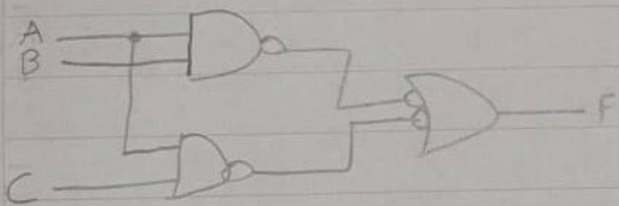
$F(A,B,C) = (A'+B'+C')(A'+B')(A'+C')$

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



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





$F = AC + AB$

Q5. $F(A,B,C,D) = (A \oplus B)'(C \oplus D)$

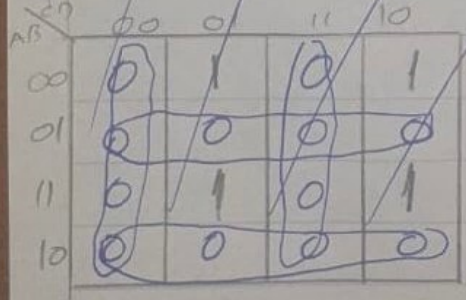
$= (A\bar{B} + \bar{A}B)'(\bar{C}D + C\bar{D})$

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

$= (A'+B)(A+B')(C'D + CD')$

$= (A'B' + AB)(C'D + CD')$

$= A'B'C'D + A'BCD' + ABC'D + ABCD'$



$F' = (C'D' + CD + A'B + AB')'$

$F = (C'D')' \cdot (CD)' \cdot (A'B)' \cdot (AB')'$

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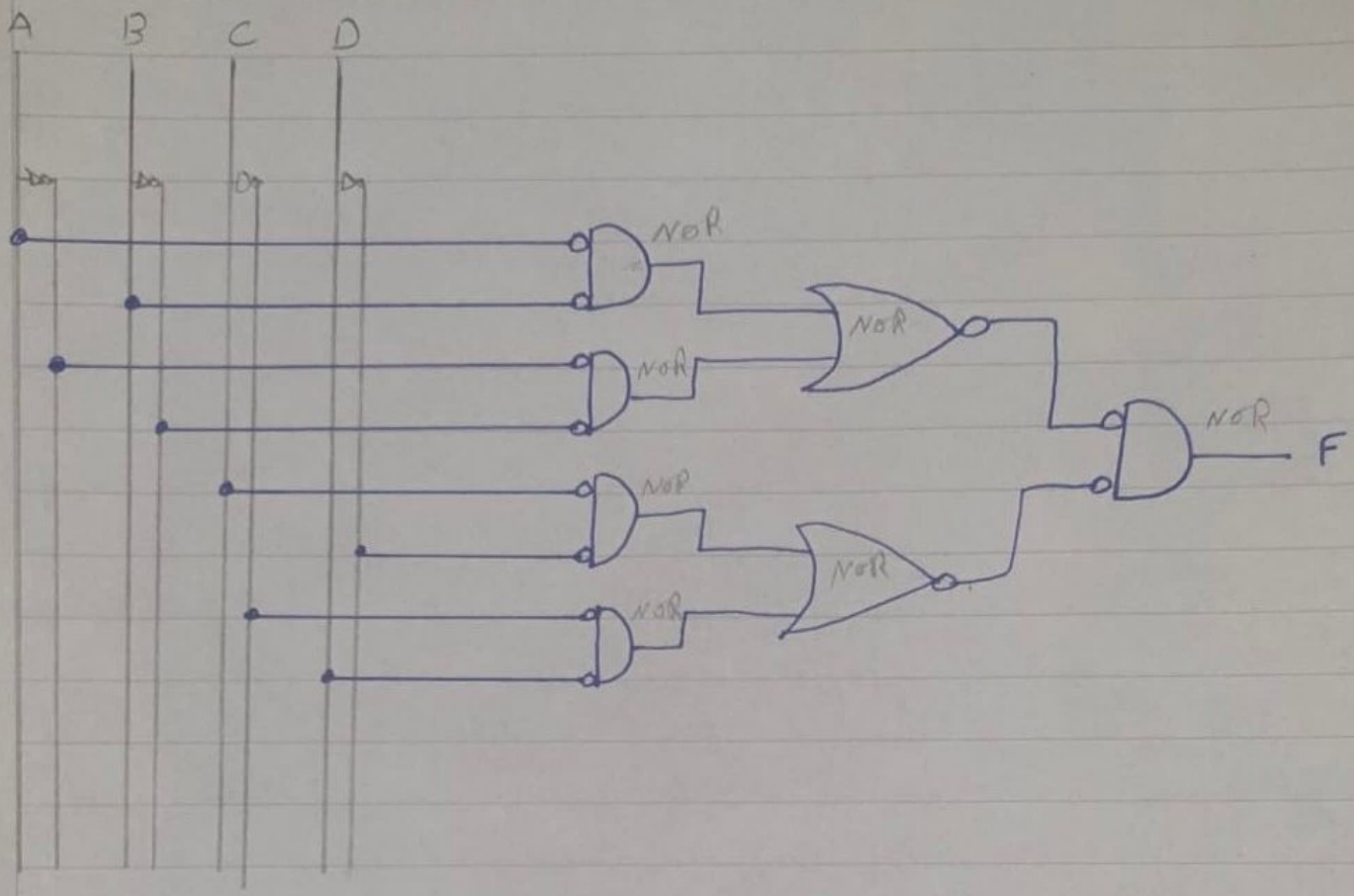
Q5

$$F(A,B,C,D) = (A \oplus B)' \cdot (C \oplus D)$$

$$= (AB + A'B') \cdot (CD' + C'D)$$

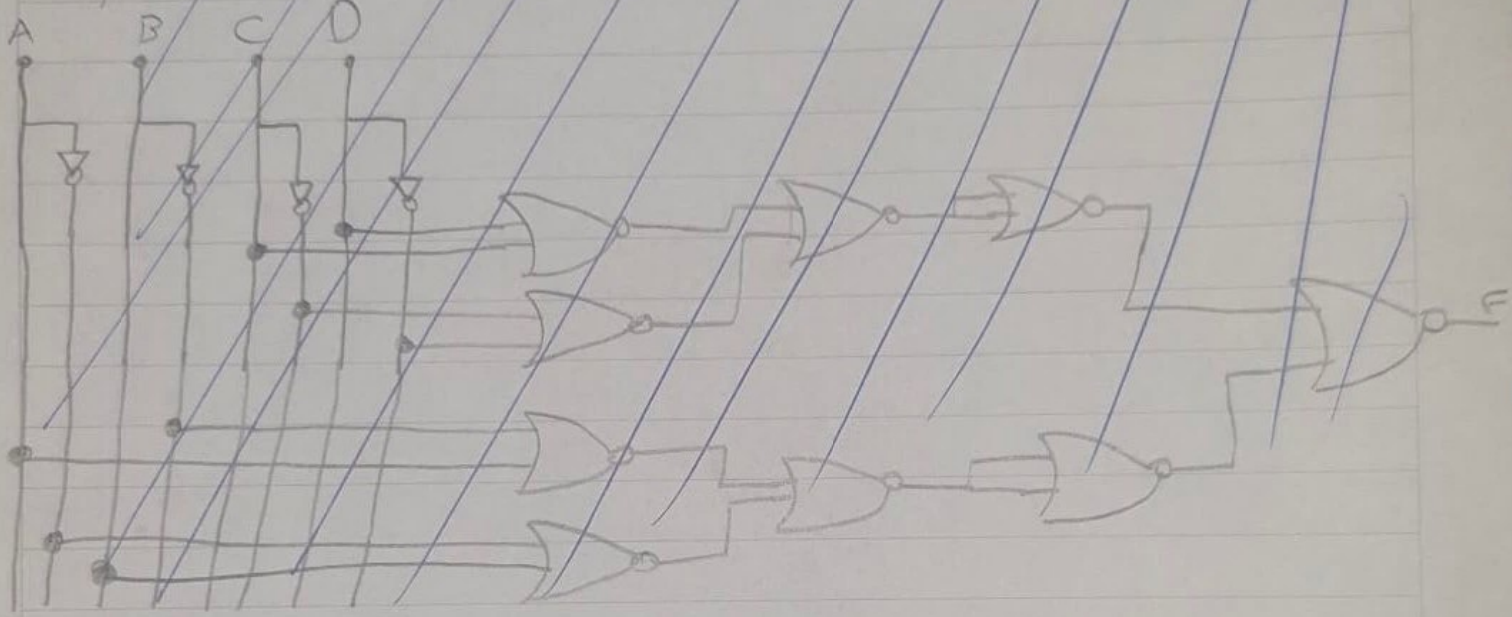


$$F = \left[(C+D)(C'+D')(A+B')(A'+B) \right]'$$

$$F = \left[(C+D)' + (C'+D')' + (A+B')' + (A'+B)' \right]'$$

$$F = \left[\left[(C+D)' + (C'+D')' \right]' \cdot \left[(A+B')' + (A'+B)' \right]' \right]'$$

$$= \left[\left[\left[(C+D)' + (C'+D')' \right]' \right]' + \left[\left[(A+B')' + (A'+B)' \right]' \right]' \right]'$$



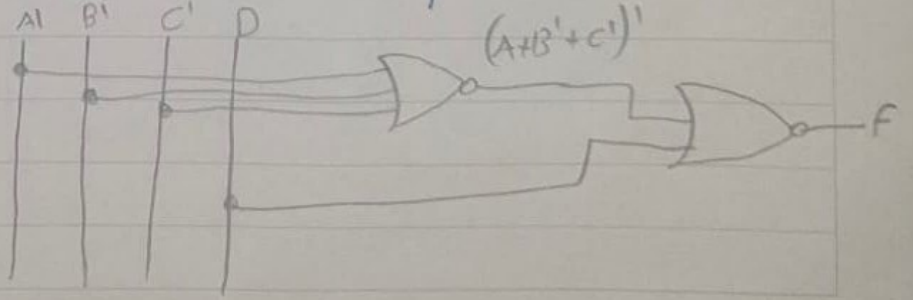
Q6. $F(A,B,C,D) = \Sigma(2,4,6,10,12)$

$d(A,B,C,D) = \Sigma(0,8,9,13)$

AB \ CD	00	01	11	10
00	0: x	1: 0	3: 0	2: 1
01	4: 1	5: 0	7: 0	6: 1
11	12: 1	13: x	15: 0	14: 0
10	8: x	9: x	11: 0	10: 1

$$F = (D + A'BC)'$$

$$F = \left(D + (A'+B'+C')'\right)'$$



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Q7. $F(A,B,C,D) = \Sigma(0,4,8,9,10,11,12,14)$

(a) NAND-AND (b) AND-OR (c) OR-NAND (d) NOR-OR

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

$F = (A'D + A'C + BD)'$ — (b)

$F = (A'D)' \cdot (A'C) \cdot (BD)'$ — (a)

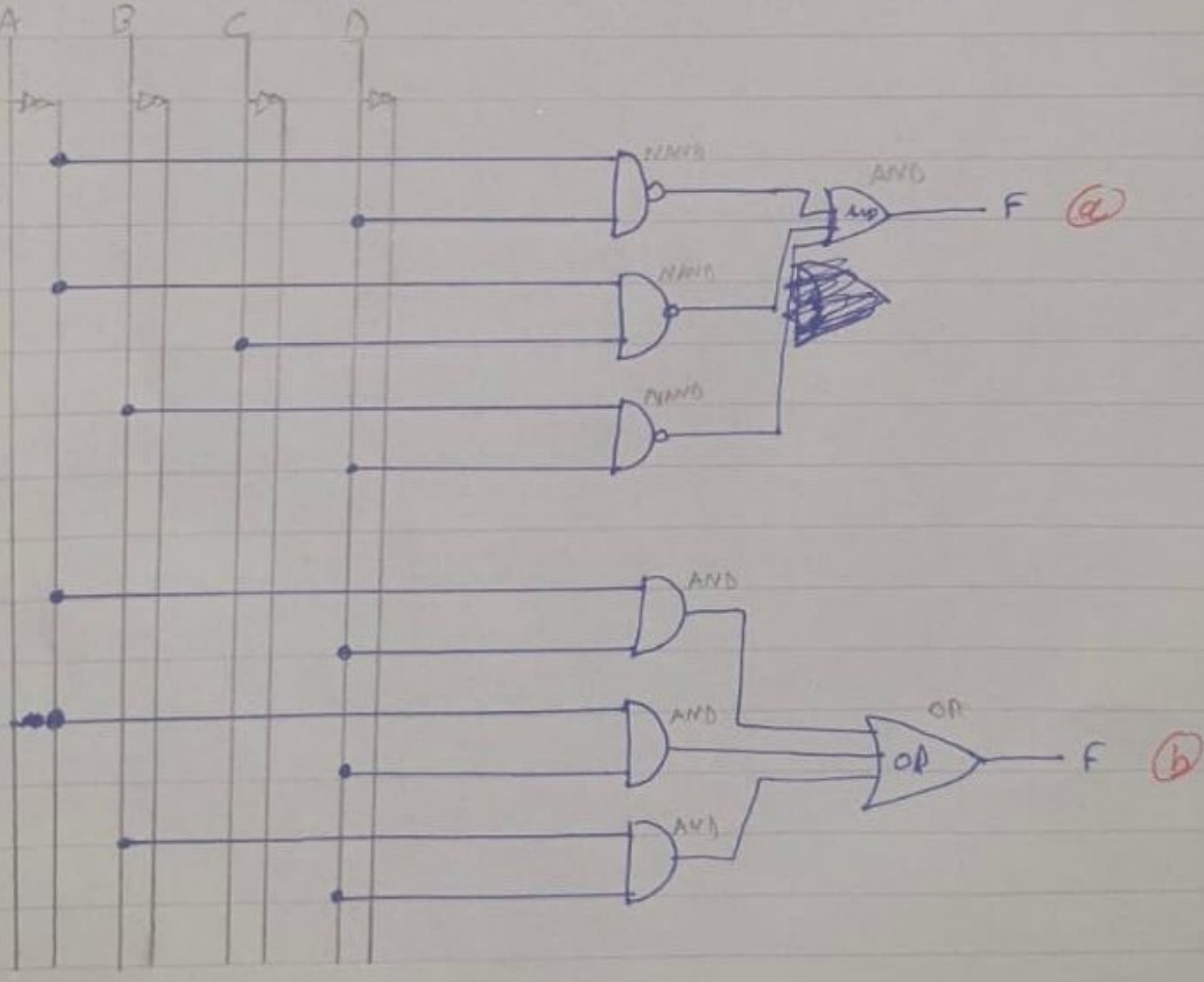
$F = \left(\left(C'D' + AB' + AD'\right)'\right)'$

$F = \left((C'D)' \cdot (AB')' \cdot (AD)'\right)'$

$F = \left((C+D)(A'+B)(A'+D)\right)'$ → (c)

$F = C'D' + AB' + AD'$

$F = (C+D)' + (A'+B)' + (A'+D)'$ → (d)



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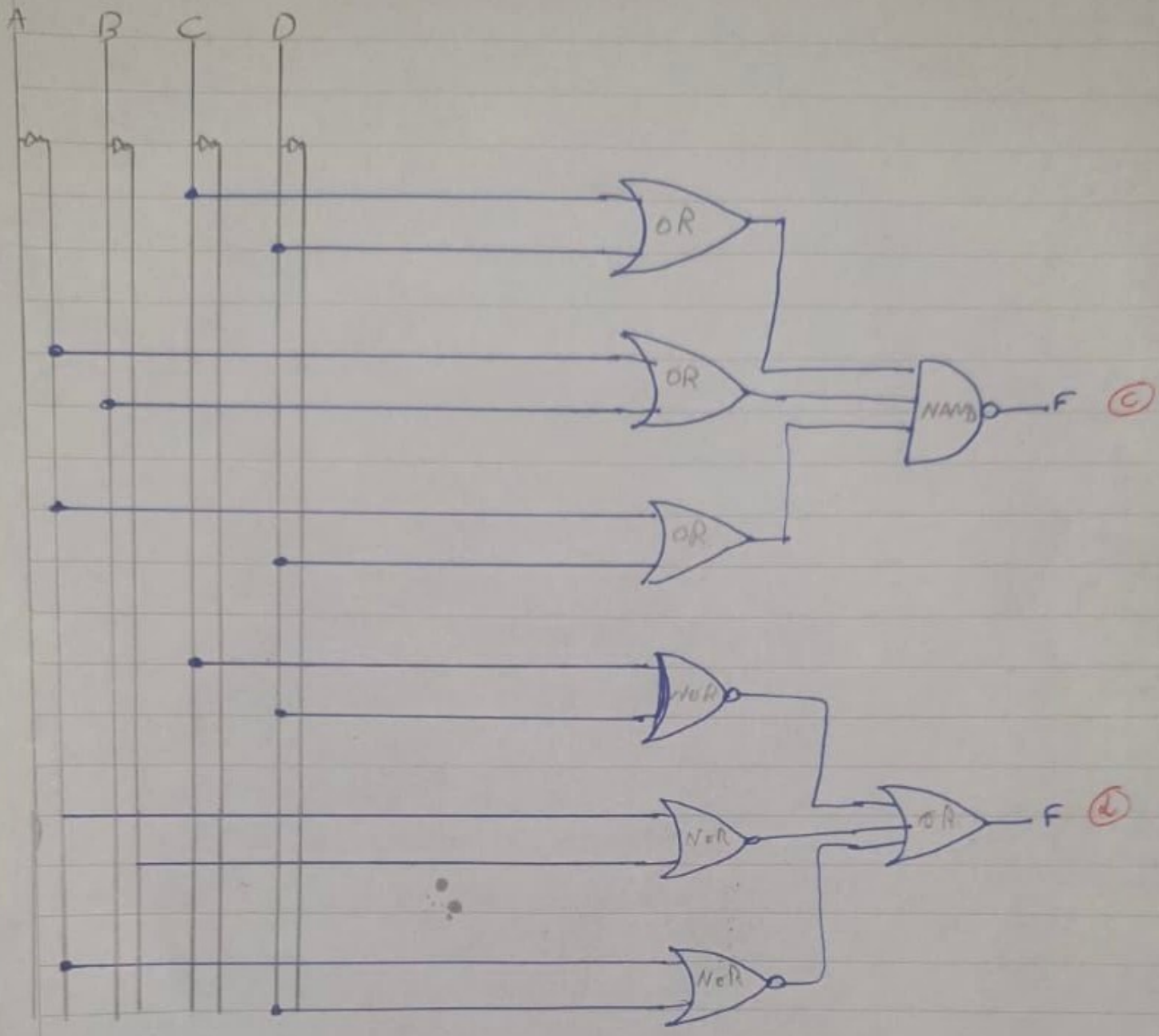
Q7.



Q8.

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