

Digital Electronics

Assignment 2-3

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1. Truth Table (Made in Excel)

Dec	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1
10	1	0	1	0	X	X	X	X	X	X	X
11	1	0	1	1	X	X	X	X	X	X	X
12	1	1	0	0	X	X	X	X	X	X	X
13	1	1	0	1	X	X	X	X	X	X	X
14	1	1	1	0	X	X	X	X	X	X	X
15	1	1	1	1	X	X	X	X	X	X	X

Assignment 2/3

- Truth Table uploaded Separately

2. Boolean Expressions:

$$a: 0000 + 0010 + 0011 + 0101 + 0110 \\ + 0111 + 1000 + 1001$$

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

$$b: 0000 + 0001 + 0010 + 0011 \\ + 0100 + 0111 + 1000 + 1001$$

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

$$c: 0000 + 0001 + 0011 \\ + 0100 + 0101 + 0110 \\ + 0111 + 1000 + 1001$$

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

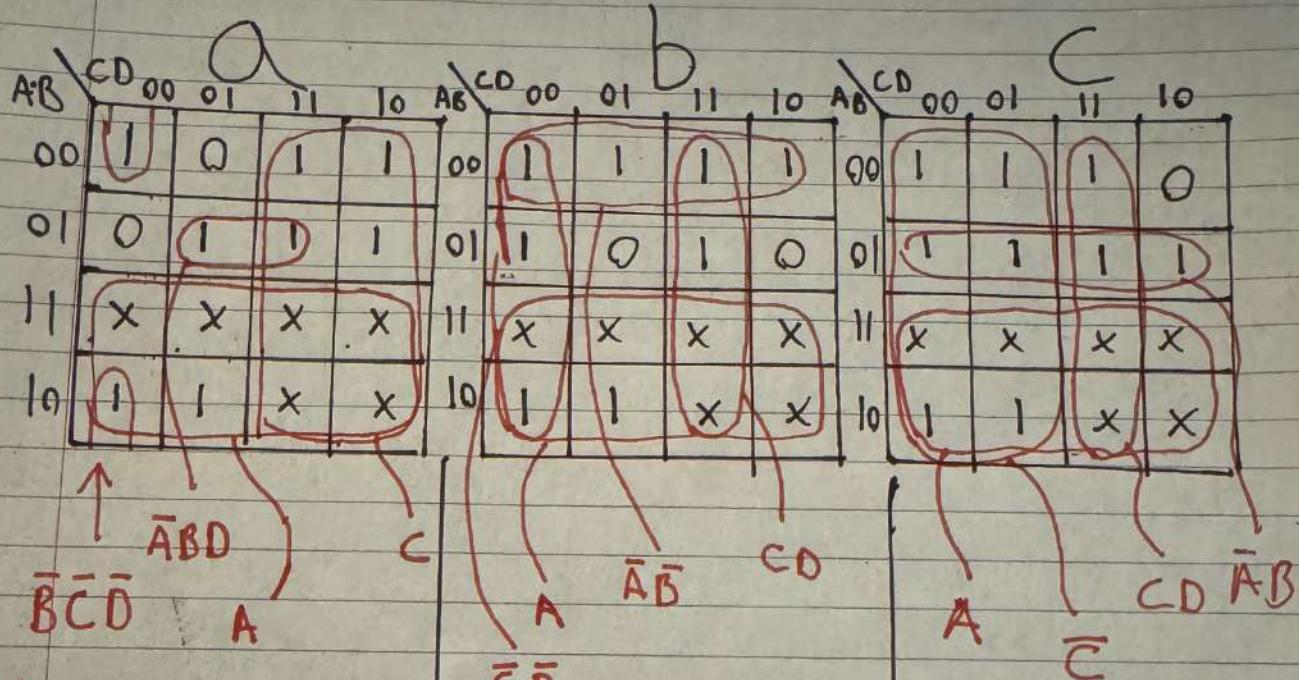
$$\begin{aligned}d: & 0000 + 0010 + 0011 + 0101 \\& + 0110 + 1000 + 1001 \\= & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}D \\& + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}\bar{C}D\end{aligned}$$

$$\begin{aligned}e: & 0000 + 0010 + 0110 + 1000 \\= & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}D\end{aligned}$$

$$\begin{aligned}f: & 0000 + 0100 + 0101 + 0110 + \\& 1000 + 1001 \\= & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}D \\& + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D\end{aligned}$$

$$\begin{aligned}g: & 0010 + 0011 + 0100 + 0101 \\& + 0110 + 1000 + 1001 \\= & \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}\bar{D} \\& + \bar{A}\bar{B}CD + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D}\end{aligned}$$

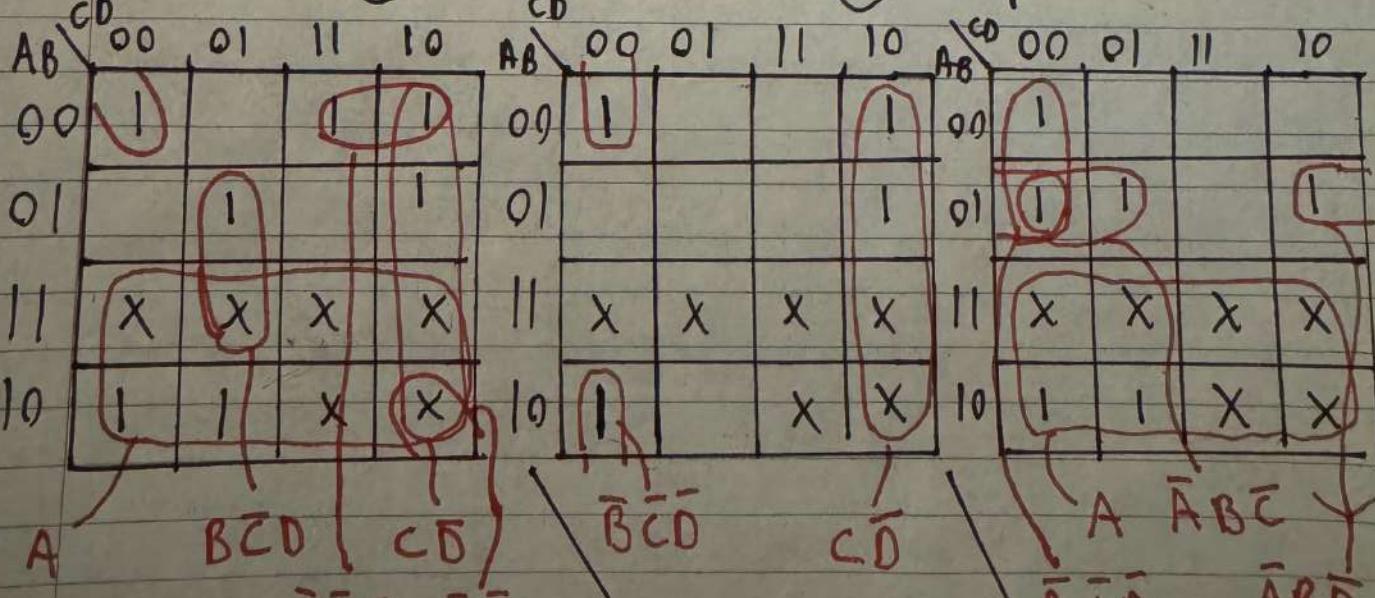
3. K-maps + 4. Simplified expressions



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

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

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

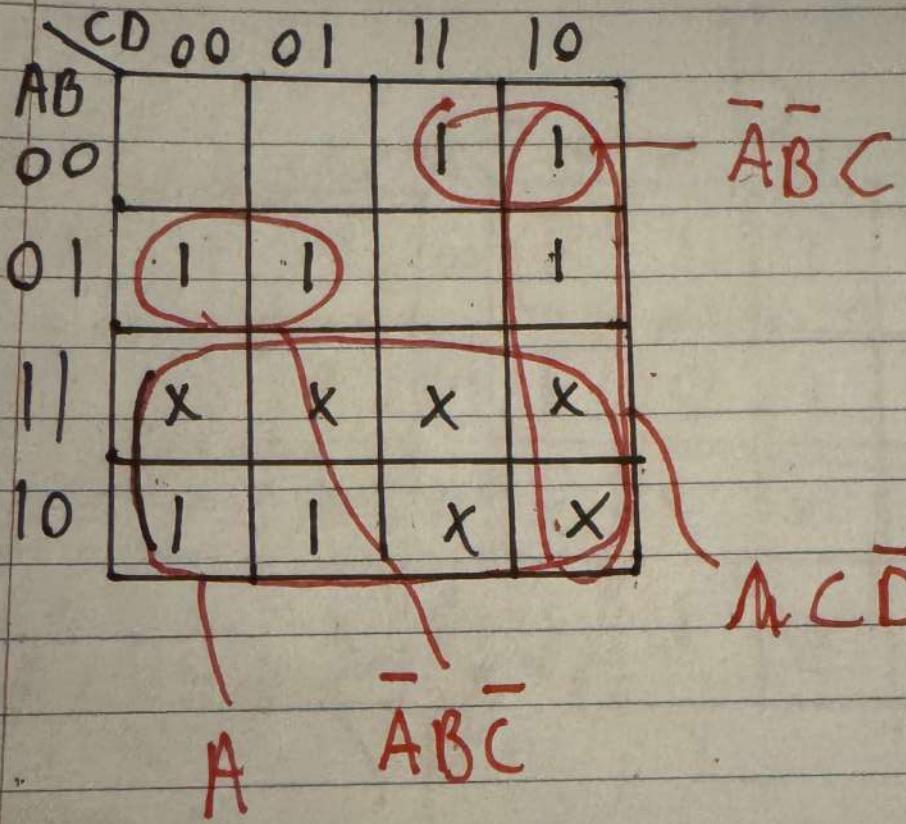


$$D = A + \bar{B}\bar{D} + C\bar{D} + B\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}$$

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

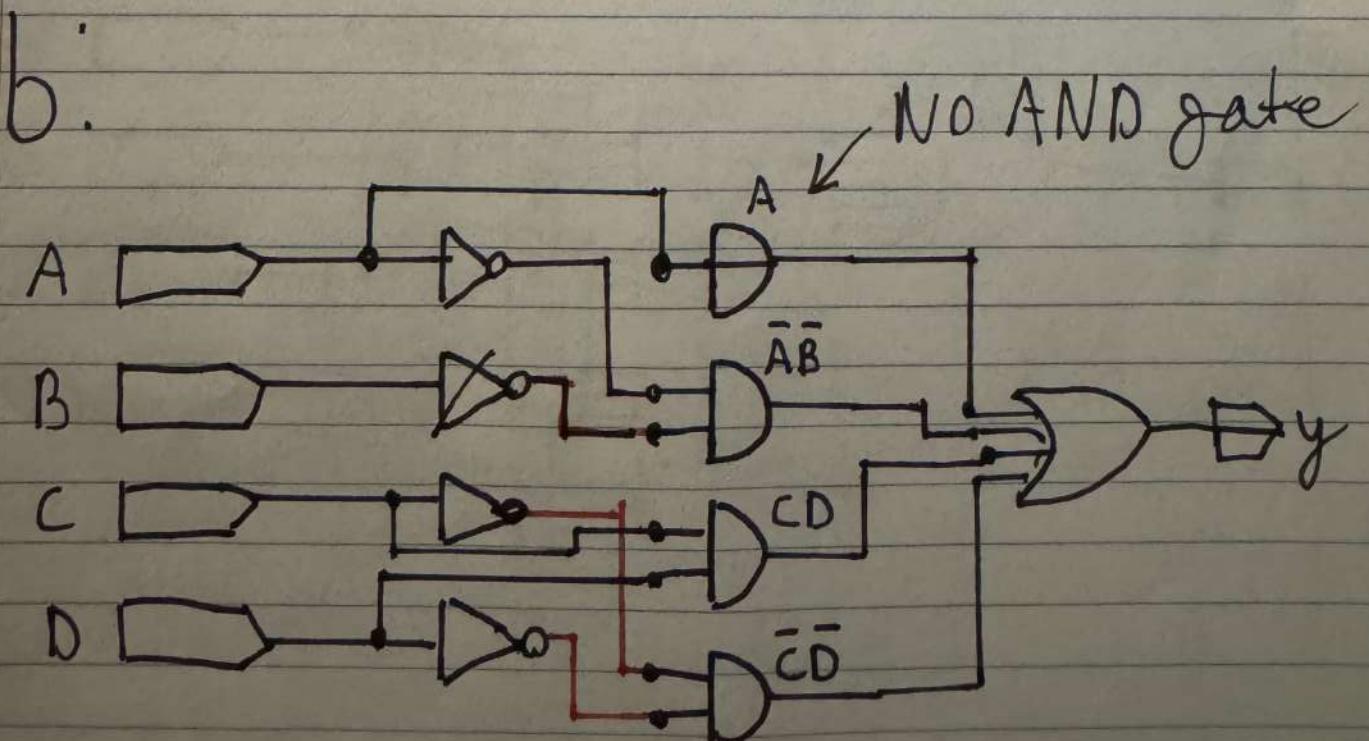
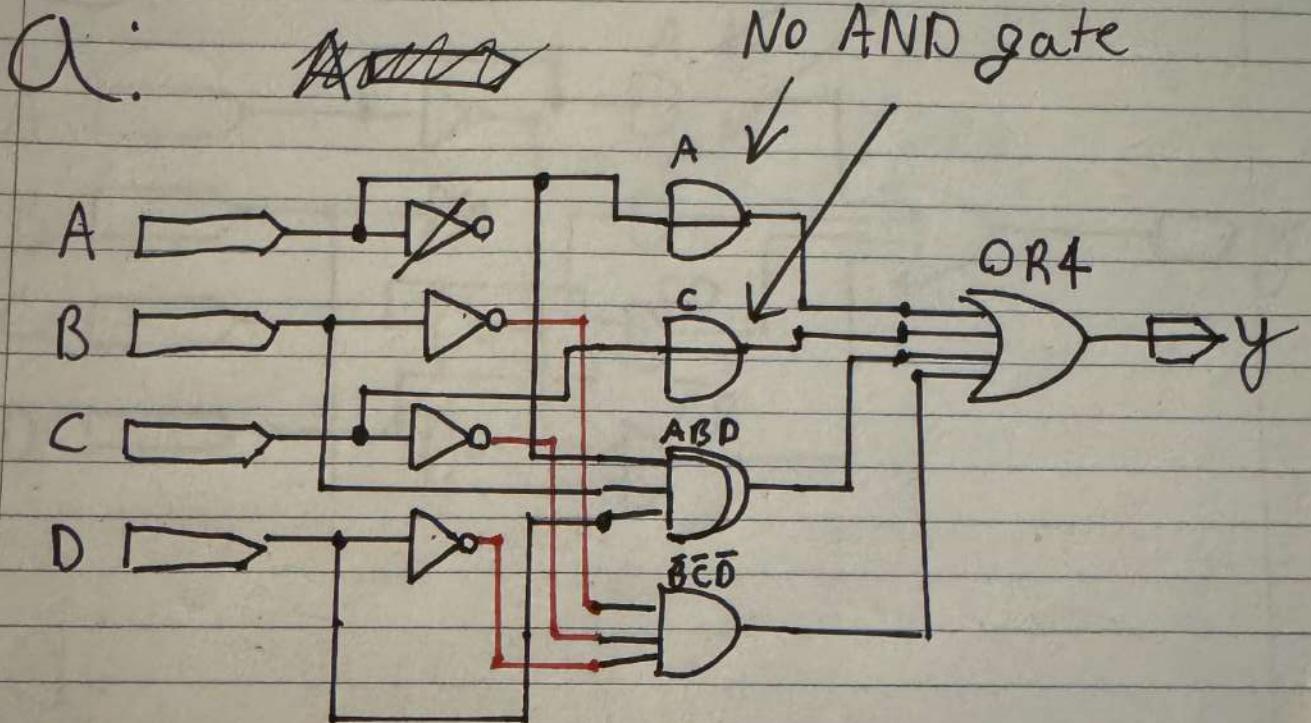
$$F = A + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{D}$$

g

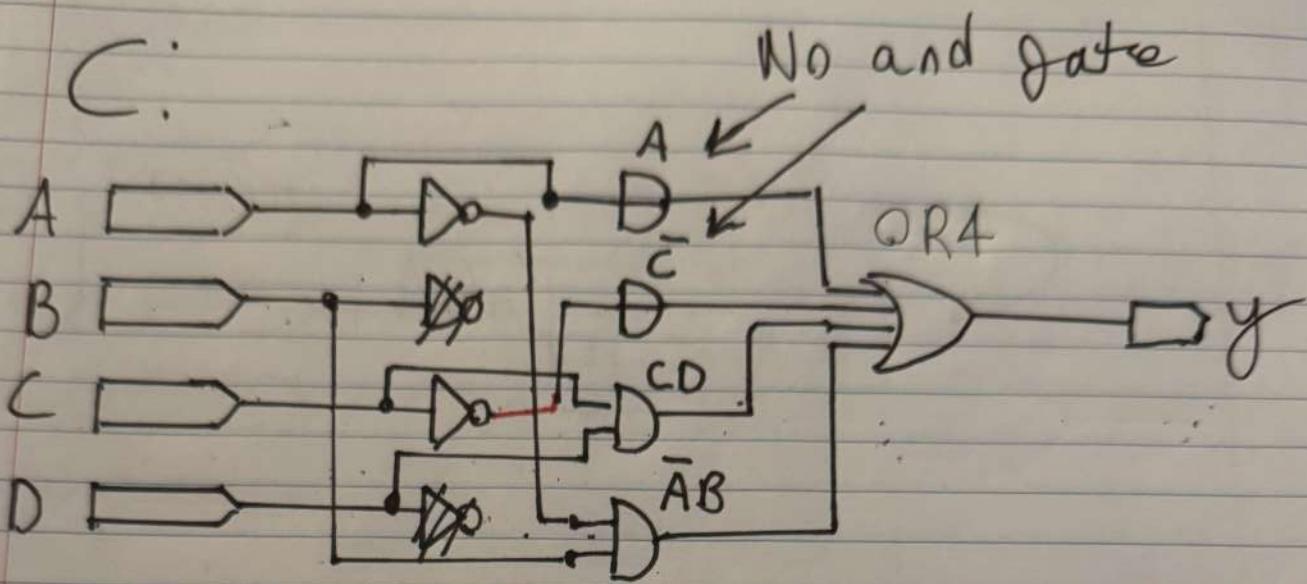


$$G = A + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \cancel{ACD} + \cancel{AB}$$

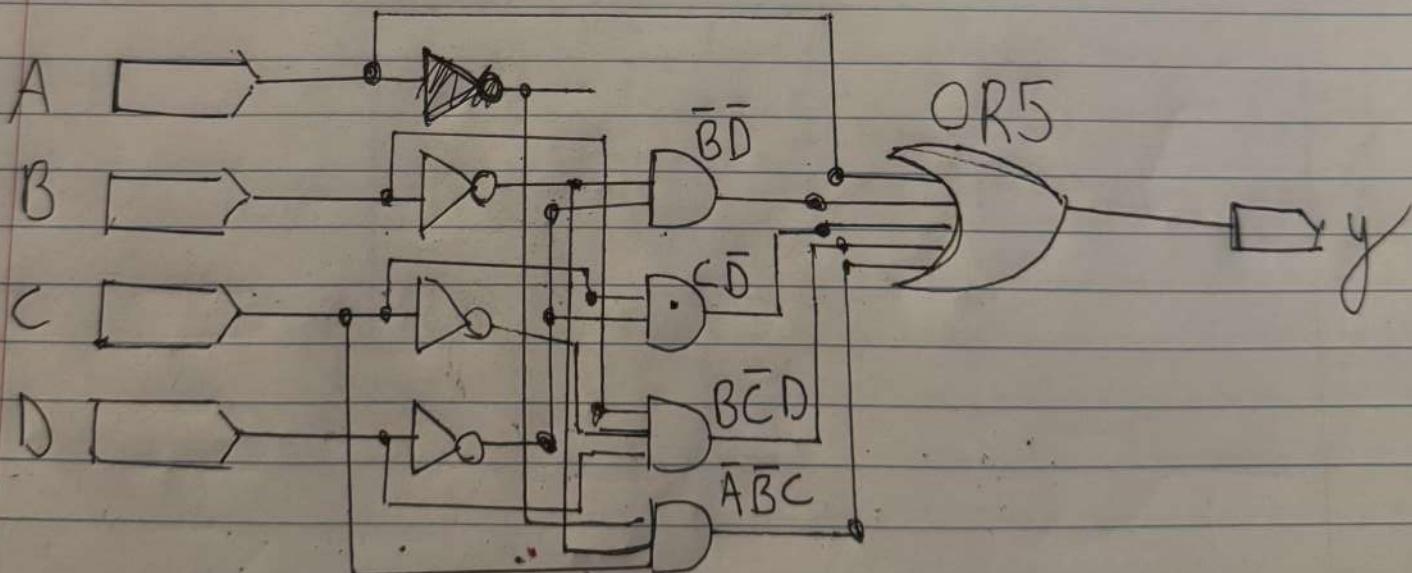
5. Circuit Diagrams



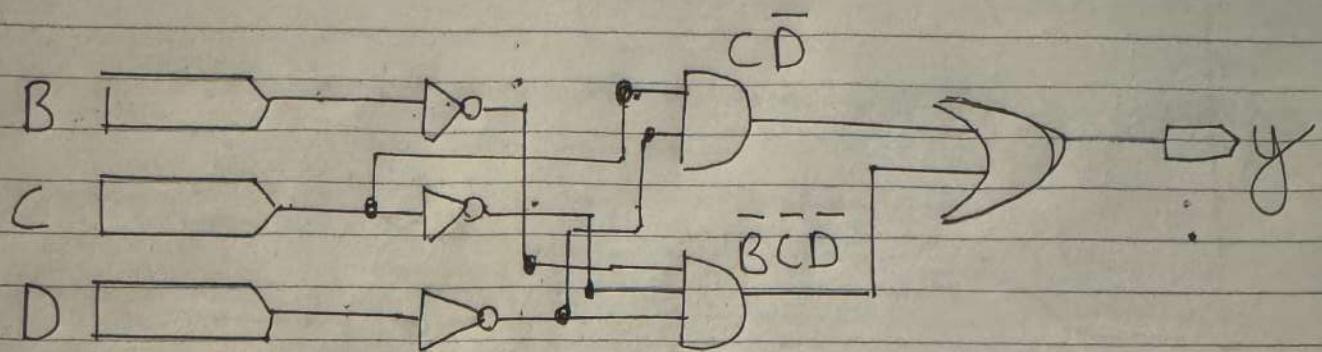
C:



d:

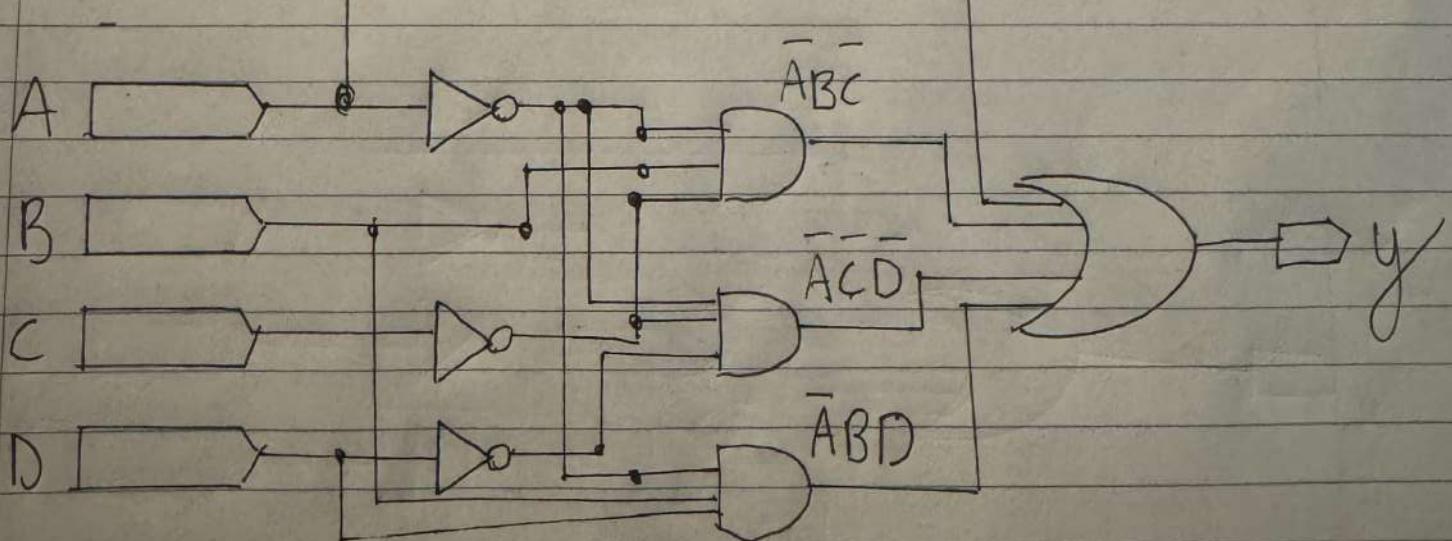


e.



F

A



j:

