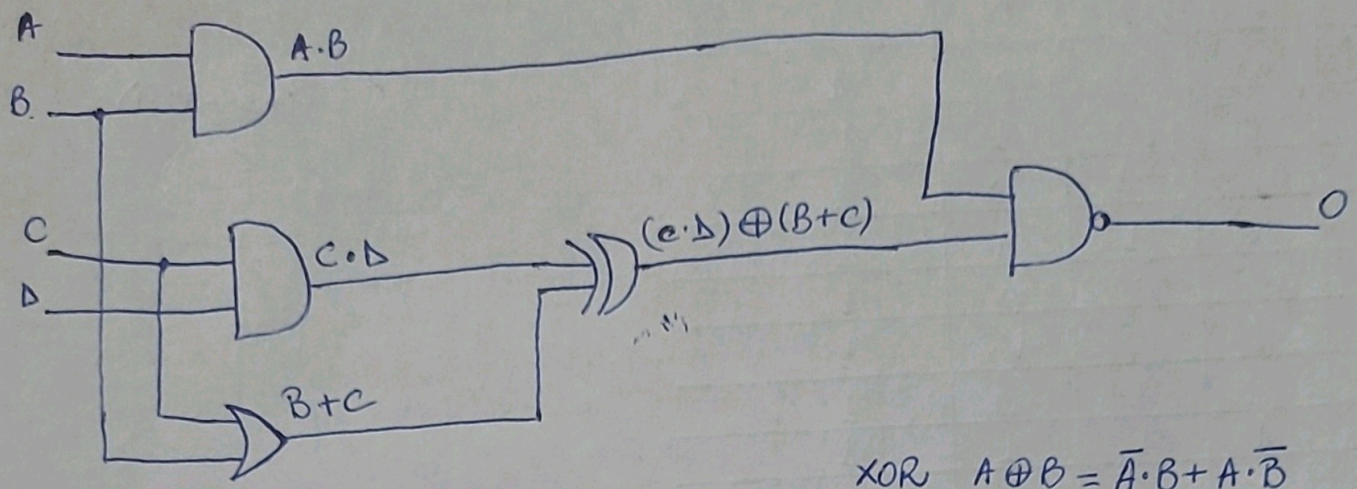

XOR $A \oplus B = \bar{A} \cdot B + A \cdot \bar{B}$

$(C \cdot D) \oplus (B+C) = \overline{(C \cdot D)} \cdot (B+C) + (C \cdot D) \cdot \overline{(B+C)}$

$$O = \overline{(A \cdot B) \cdot ((C \cdot D) \oplus (B+C))}$$

$$O = \overline{(A \cdot B) \cdot \left(\overline{(C \cdot D)} \cdot (B+C) + (C \cdot D) \cdot \overline{(B+C)} \right)}$$

Aplic de Morgan $\overline{A \cdot B} = \bar{A} + \bar{B}$

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

Aplic iar de Morgan

$$O = \bar{A} + \bar{B} + \left(\overline{C \cdot D} + \overline{B+C} \right) \left(\bar{C} + \bar{D} + \overline{\overline{B+C}} \right)$$

Aplic dubla negare $\overline{\bar{A}} = A$

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

Aplic de Morgan $\overline{A+B} = \bar{A} \cdot \bar{B}$

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

Aplic complementul $A + \bar{A} = 1$

$$O = \bar{A} + \bar{B} + (C \cdot D + \bar{B} \cdot \bar{C}) \cdot (\bar{D} + B + 1)$$

Aplic elementul neutru $A + 1 = 1$

$$O = \bar{A} + \bar{B} + (C \cdot D + \bar{B} \cdot \bar{C}) \cdot 1$$

Aplic identitatea $A \cdot 1 = A$)

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

Aplic absorptia $A + A \cdot B = A$

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

SCHEMA ~~SCHEMA~~ MINIMALIZATĂ

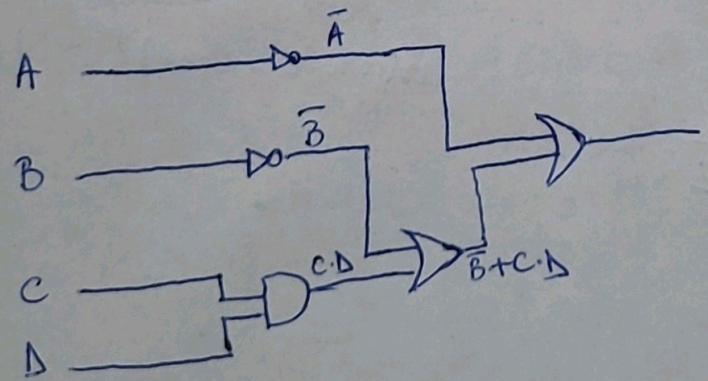

TABELA DE ADEVĂR

A	B	C	D	O
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

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

$1 + 1 + 1 \cdot 1 = 1$
$1 + 1 + 1 \cdot 0 = 1$
$1 + 1 + 0 \cdot 1 = 1$
$1 + 1 + 0 \cdot 0 = 1$
$1 + 0 + 1 \cdot 1 = 1$

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

VK FND → sumă de produse

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

I II III

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

Verilog

```
assign O = (~A) | (~B) | (C&D);
```