

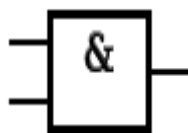
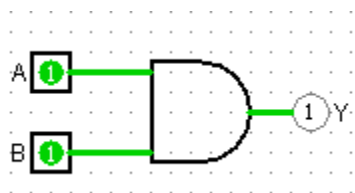
DIGITALNA LOGIKA

OSNOVNI LOGIČKI SKLOPOVI

Osnovni logički sklopovi

I-sklop $Y=AB$

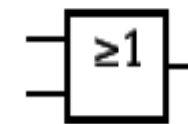
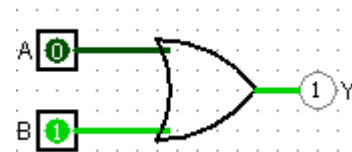
ANSI-standard IEC-standard



tablica stanja

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

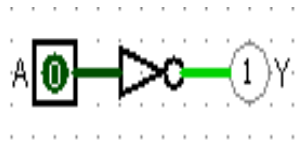
III-sklop $Y=A+B$



tablica stanja

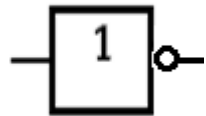
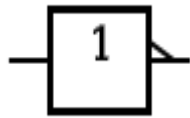
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

- NE-sklop

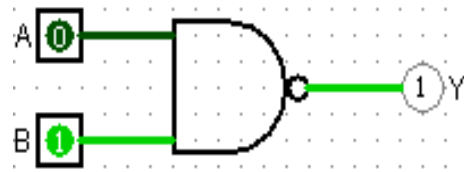


$$Y = \overline{A}$$

A	Y
0	1
1	0

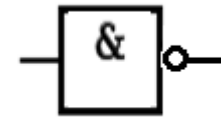
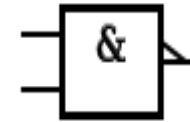


NI-sklop



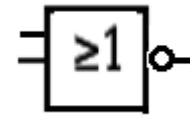
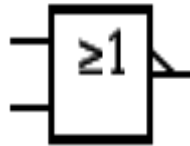
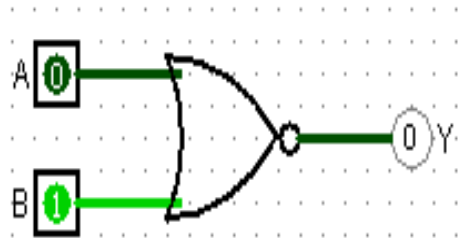
$$Y = \overline{AB}$$

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0



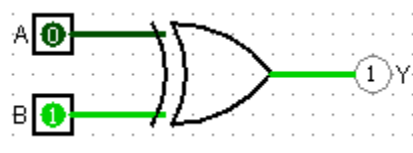
NILI-sklop

$$Y = \overline{A+B}$$

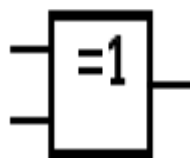


A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

XOR-sklop/isključivo ILI

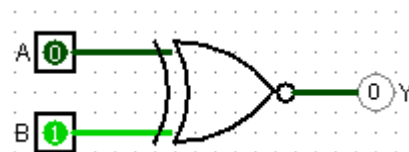


$$Y = A \oplus B$$

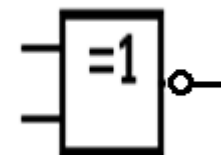
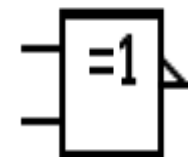


A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

XNOR-sklop/isključivo NILI



$$Y = \overline{A \oplus B}$$

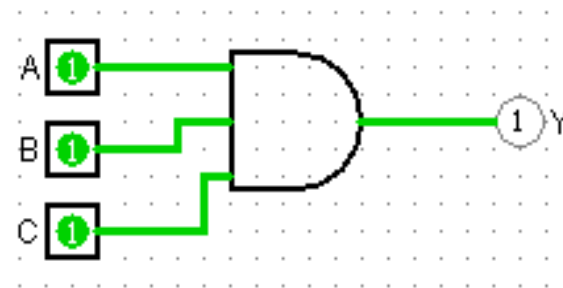


A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

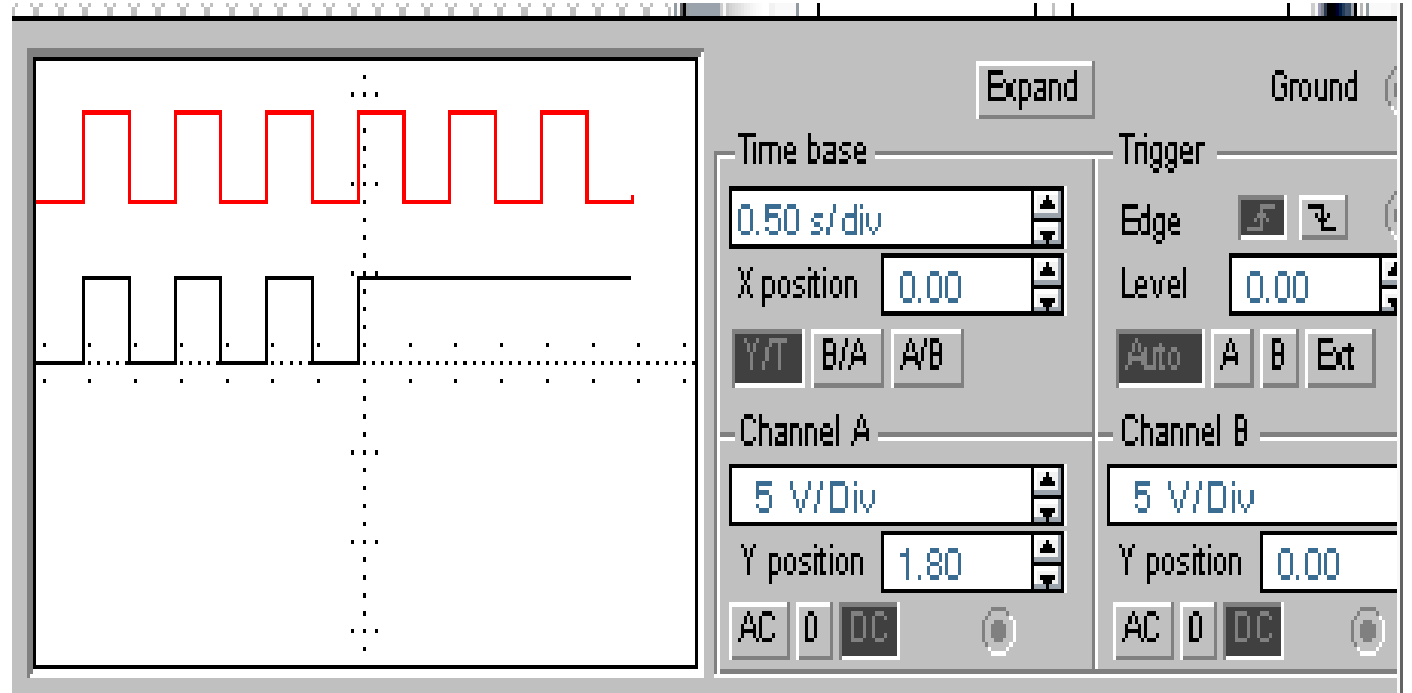
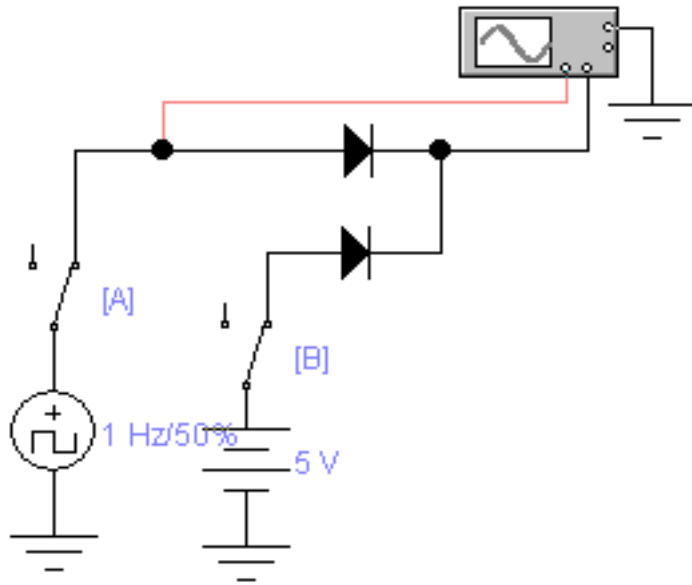
Realizirati I-sklop sa tri ulaza

- $Y=ABC$

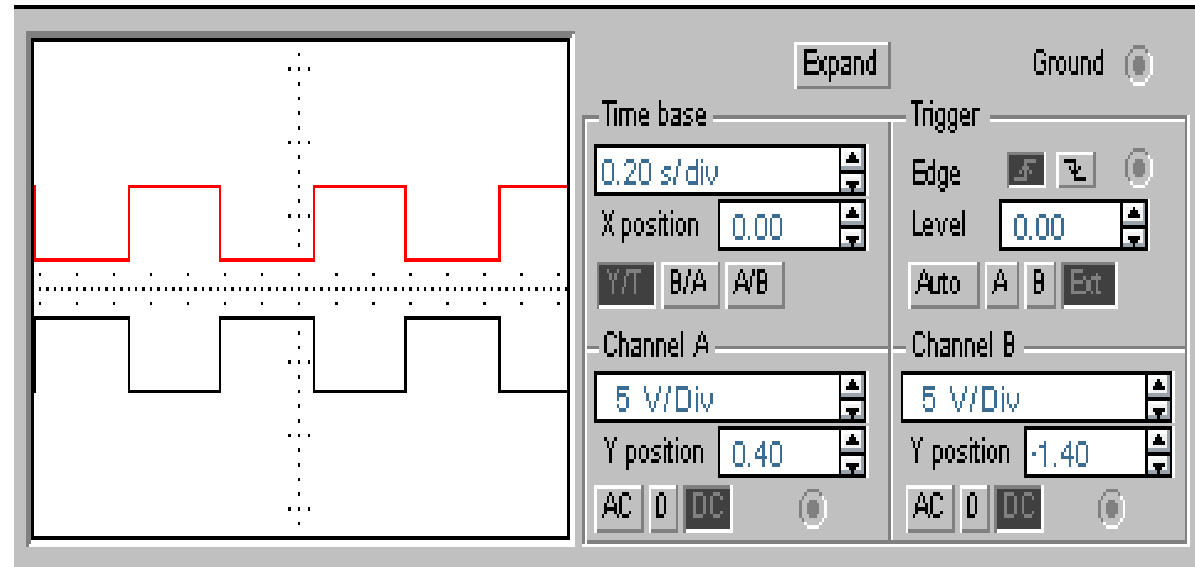
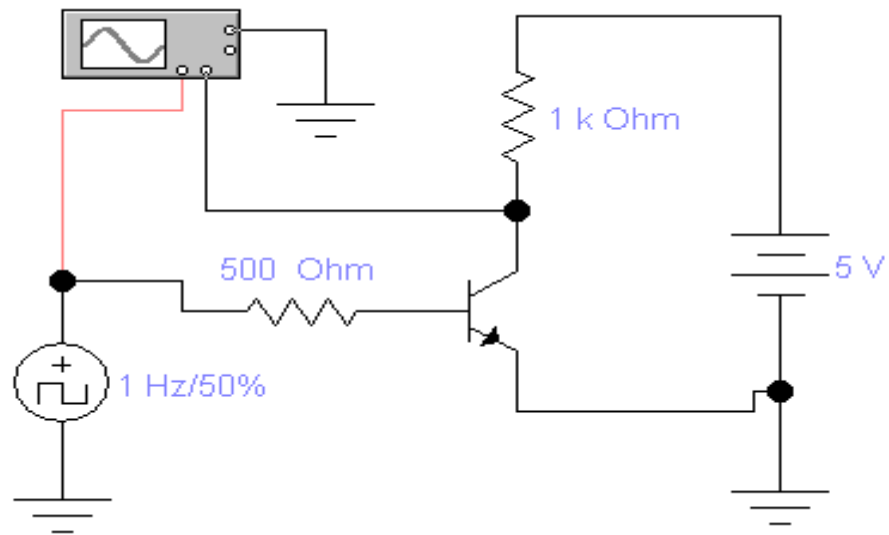
A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1



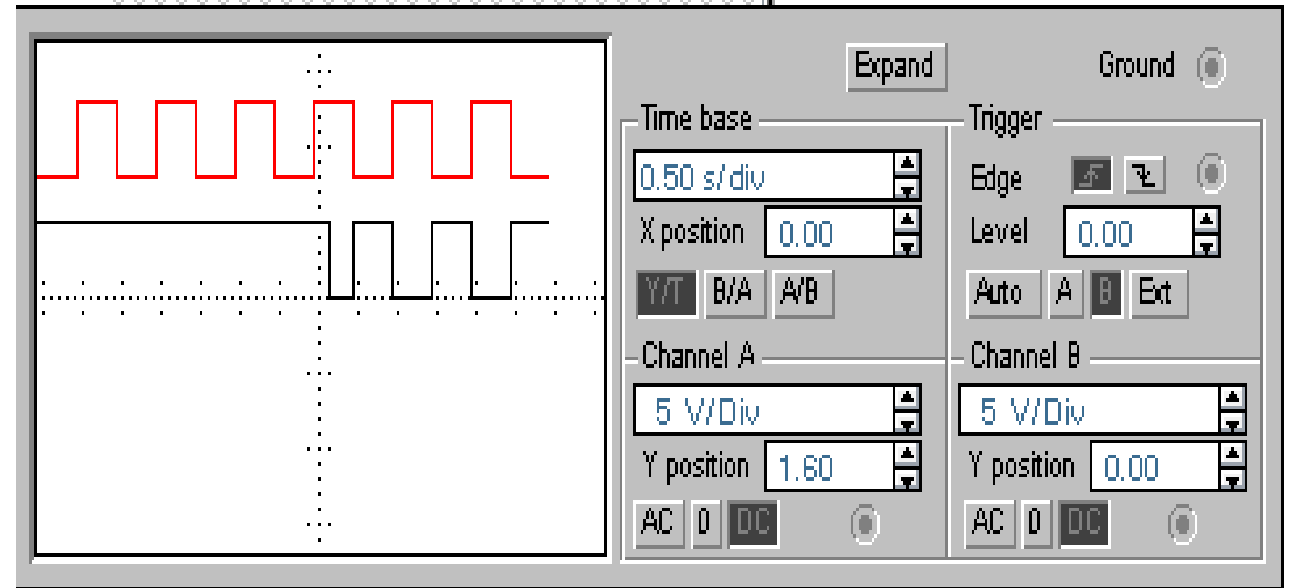
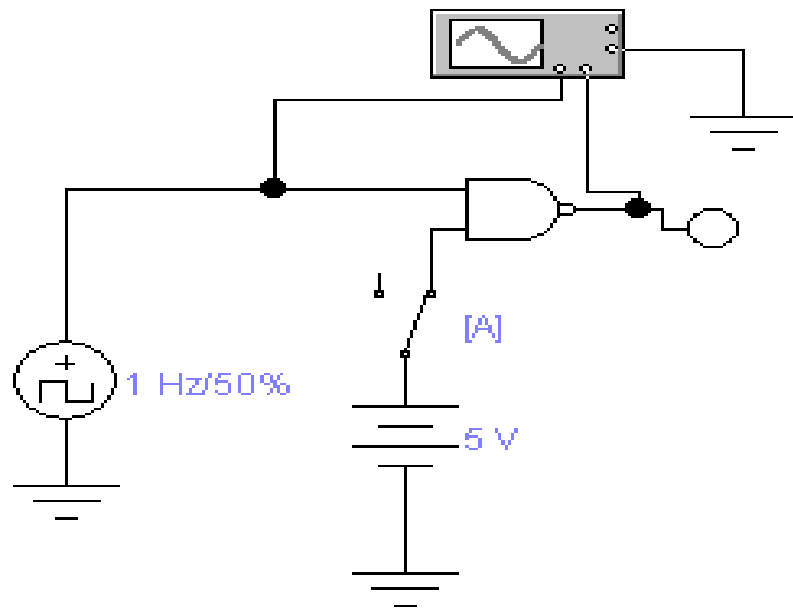
Simulacija diodnog ILI sklopa



NE-logički sklop-simulacija EWB

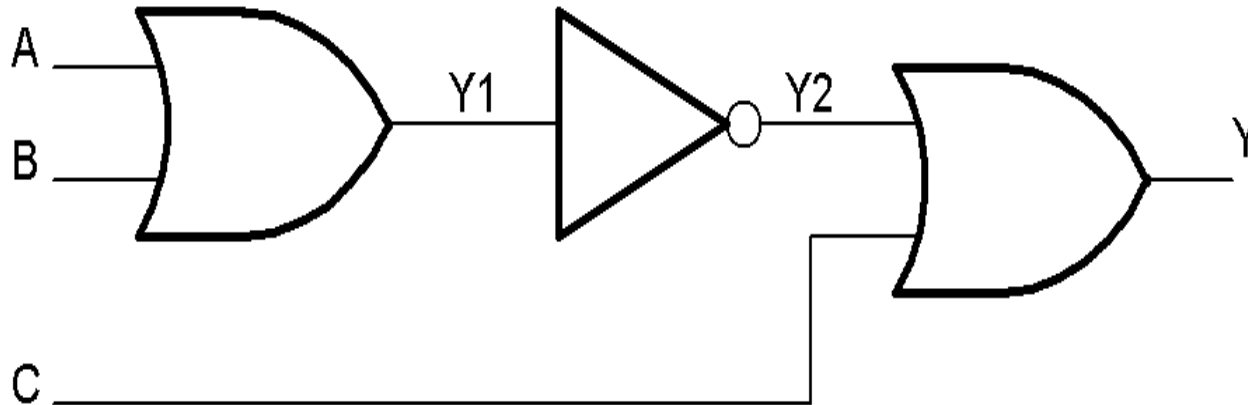


Na ulaz logičkog sklopa NI dovodimo niz pravokutnih impulsa, a drugi ulaz držimo jedno vrijeme u 1, pa u 0. Odrediti stanje izlaza.



Napisati tablicu stanja i logički izraz za logičku shemu

- Prvo - **označiti međustanja** koja predstavljaju rezultat rada osnovnih sklopova (krenuti od ulaznih vrijednosti, s lijeva na desno).

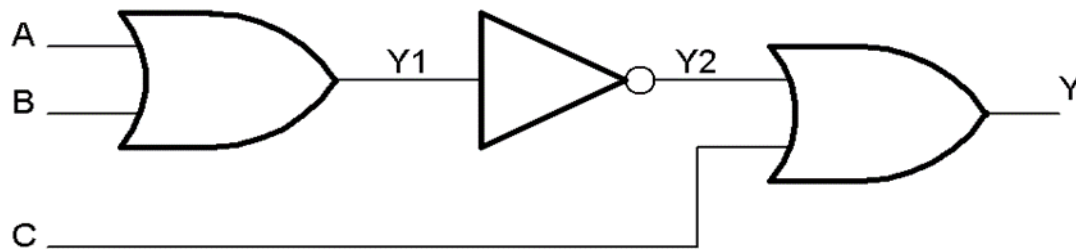


- U tablici stanja treba predvidjeti:
 - stupce koji predstavljaju **ulazne operande**,
 - stupce koji predstavljaju vrijednosti prethodno uvedenih **međustanja**,
 - stupac **krajnjeg rezultata**.

A	B	C	$Y1=A+B$	$Y2=\overline{Y1}$	$Y=Y2+C$
---	---	---	----------	--------------------	----------

A	B	C	$Y1=A+B$	$Y2=\overline{Y1}$	$Y=Y2+C$
0	0	0	0	1	1
0	0	1	0	1	1
0	1	0	1	0	0
0	1	1	1	0	1
1	0	0	1	0	0
1	0	1	1	0	1
1	1	0	1	0	0
1	1	1	1	0	1

Za završnu logičku funkciju treba krenuti **s desna na lijevo**, od krajnjeg izlaza i logičkih vrata kojima taj izlaz pripada.



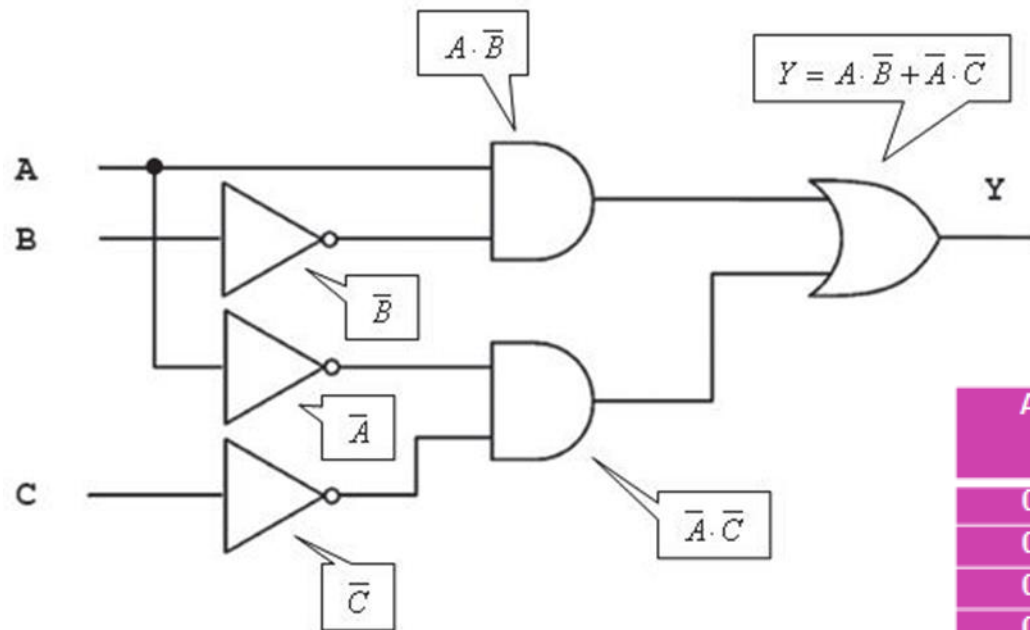
$$Y = Y2 + C$$

$$Y = (\overline{Y1}) + C$$

$$Y = (\overline{A+B}) + C$$

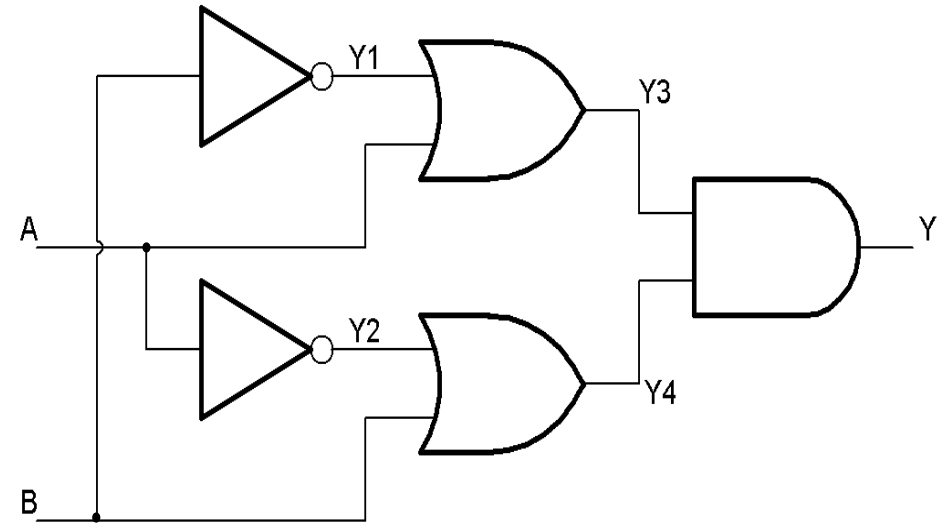
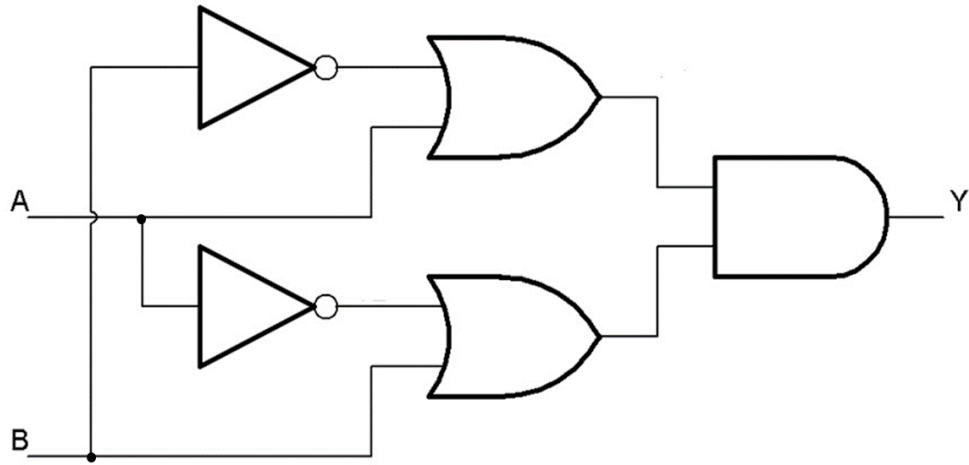
- Postupak ponavljati sve dok članovi logičkog izraza ne budu osnovni operandi. treba dok logičkog budu ulazni

Za zadanu logičku shemu napisati logičku funkciju i pripadajuću tablicu stanja



A	B	C	\bar{B}	$A\bar{B}$	\bar{A}	\bar{C}	$\bar{A}\bar{C}$	Y
0	0	0	1	0	1	1	1	1
0	0	1	1	0	1	0	0	0
0	1	0	0	0	1	1	1	1
0	1	1	0	0	1	0	0	0
1	0	0	1	1	0	1	0	1
1	0	1	1	1	0	0	0	1
1	1	0	0	0	0	1	0	0
1	1	1	0	0	0	0	0	0

Napisati tablicu stanja i logički izraz za logičku shemu (izraz po potrebi minimizirati):



A	B	$Y1=B$	$Y2=A$	$Y3=Y1+A$	$Y4=Y2+B$	$Y=Y3 \cdot Y4$
0	0	1	1	1	1	1
0	1	0	1	0	1	0
1	0	1	0	1	0	0
1	1	0	0	1	1	1

$$Y = Y3 \cdot Y4$$

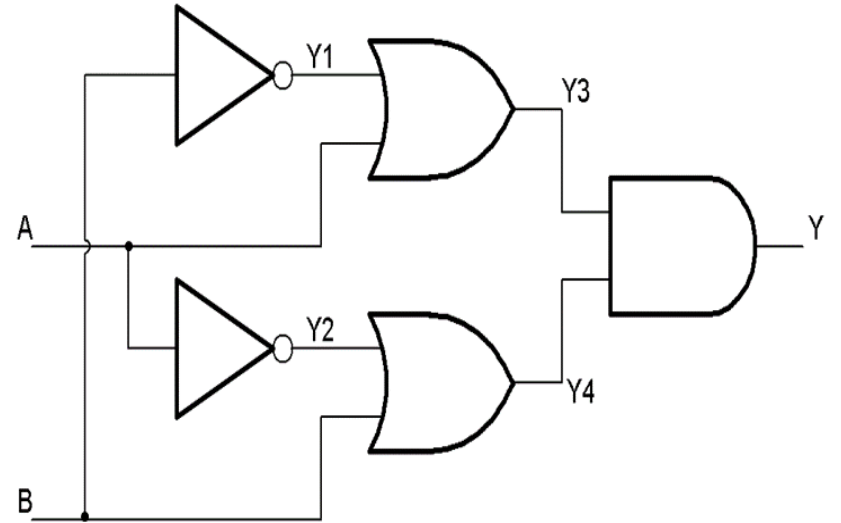
$$Y = (Y1 + A) \cdot (Y2 + B)$$

$$Y = (\overline{B} + A) \cdot (\overline{A} + B)$$

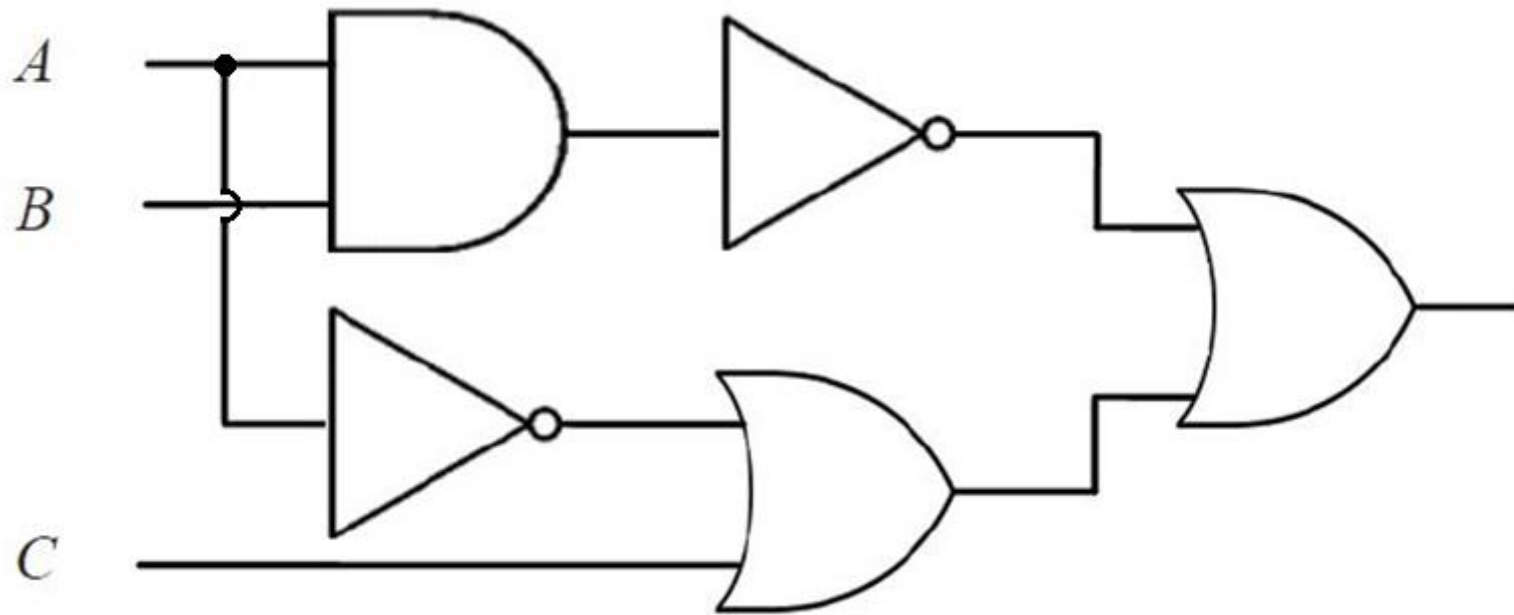
$$Y = \overline{B} \cdot \overline{A} + \overline{B} \cdot B + A \cdot \overline{A} + A \cdot B$$

$$Y = \overline{B} \cdot \overline{A} + A \cdot B$$

$$Y = \overline{A + B} + A \cdot B$$



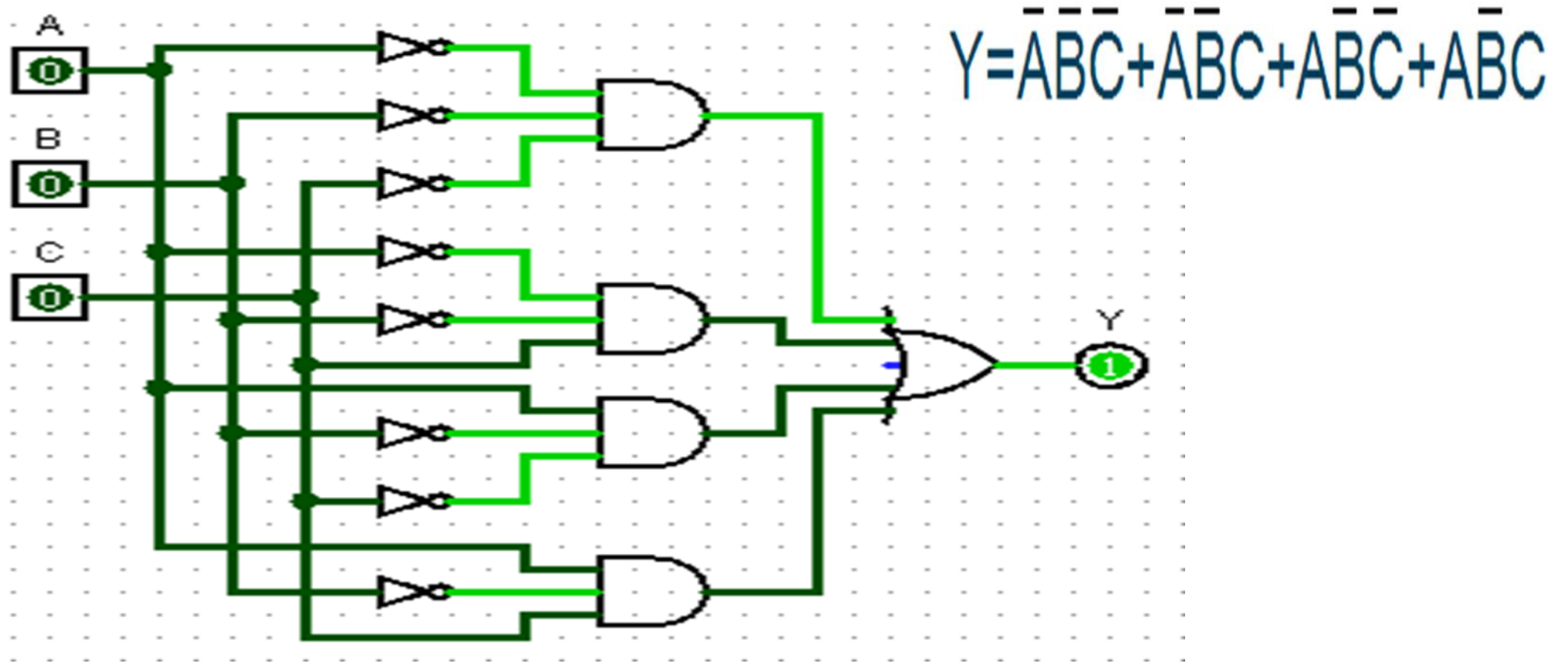
Napisati tablicu stanja i logički izraz za zadanu logičku shemu





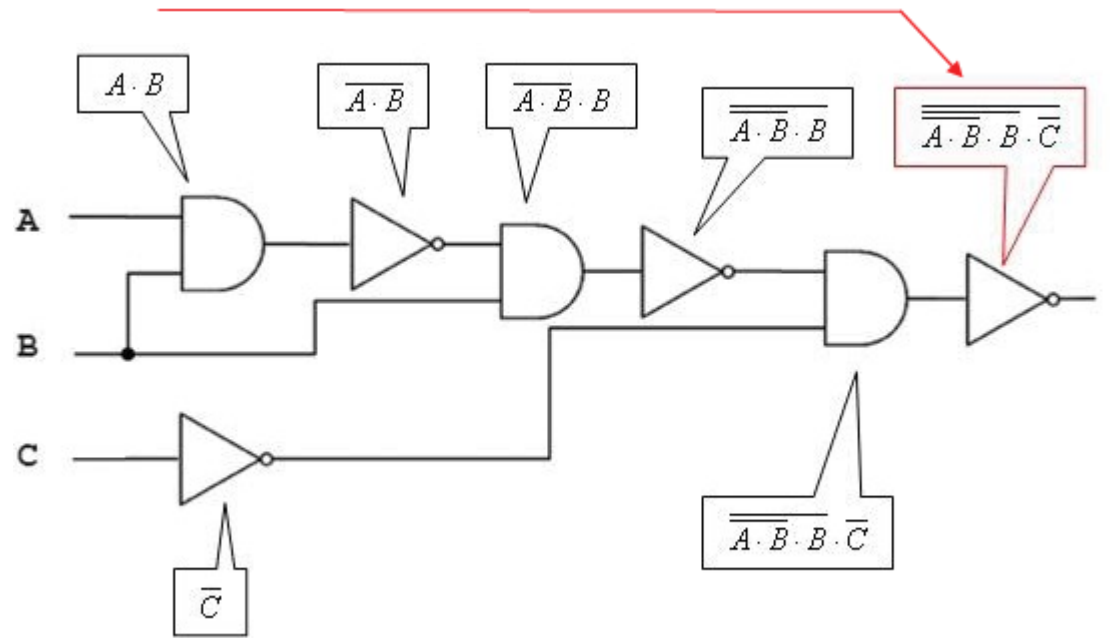
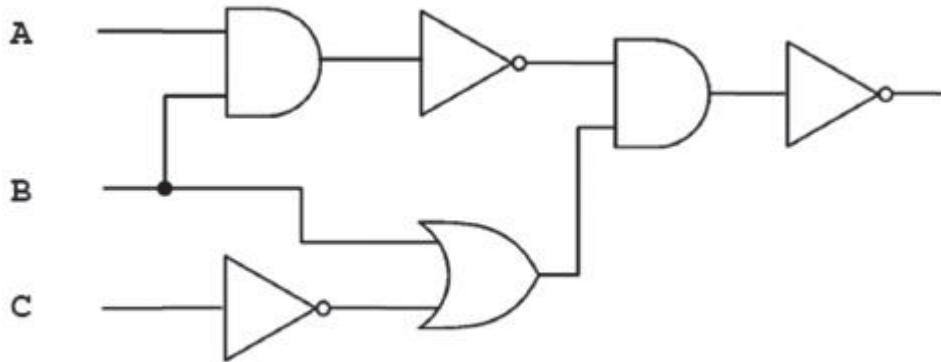
A	B	C	$Y1=A \cdot B$	$Y2=Y1$	$Y3=A$	$Y4=Y3+C$	$Y=Y2+Y4$
0	0	0	0	1	1	1	1
0	0	1	0	1	1	1	1
0	1	0	0	1	1	1	1
0	1	1	0	1	1	1	1
1	0	0	0	1	0	0	1
1	0	1	0	1	0	1	1
1	1	0	1	0	0	0	0
1	1	1	1	0	0	1	1

Iz zadane logičke sheme napisati logički izraz i tablicu stanja



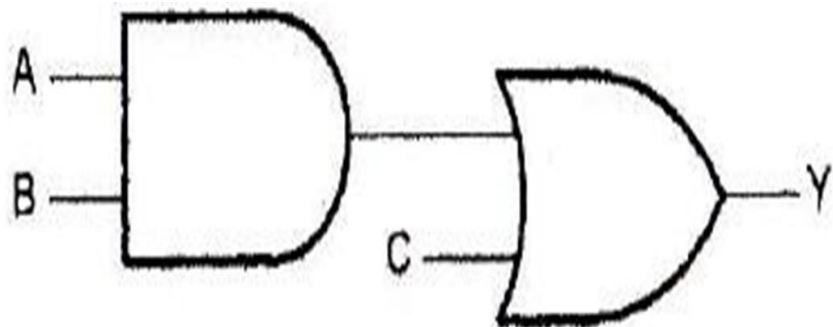
A	B	C	\bar{A}	\bar{B}	\bar{C}	$\bar{A}\bar{B}\bar{C}$	$\bar{A}\bar{B}C$	$\bar{A}B\bar{C}$	$A\bar{B}\bar{C}$	Y
0	0	0	1	1	1	1	0	0	0	1
0	0	1	1	1	0	0	1	0	0	1
0	1	0	1	0	1	0	0	0	0	0
0	1	1	1	0	0	0	0	0	0	0
1	0	0	0	1	1	0	0	1	0	1
1	0	1	0	1	0	0	0	0	1	1
1	1	0	0	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0

Napisati logički izraz za logičke sheme:



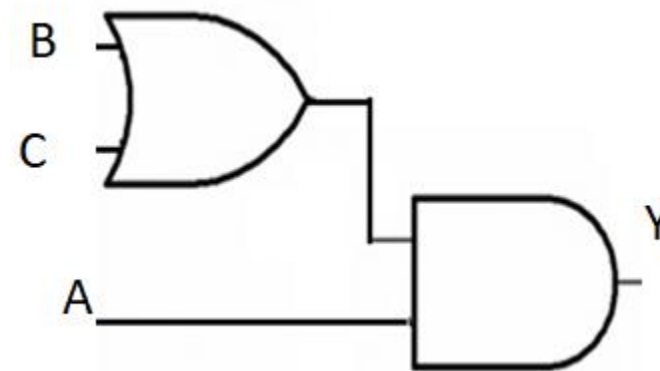
Nacrtati logičku shemu na osnovu logičkog izraza i napisati pripadajuću tablicu stanja

$$Y = A \cdot B + C$$



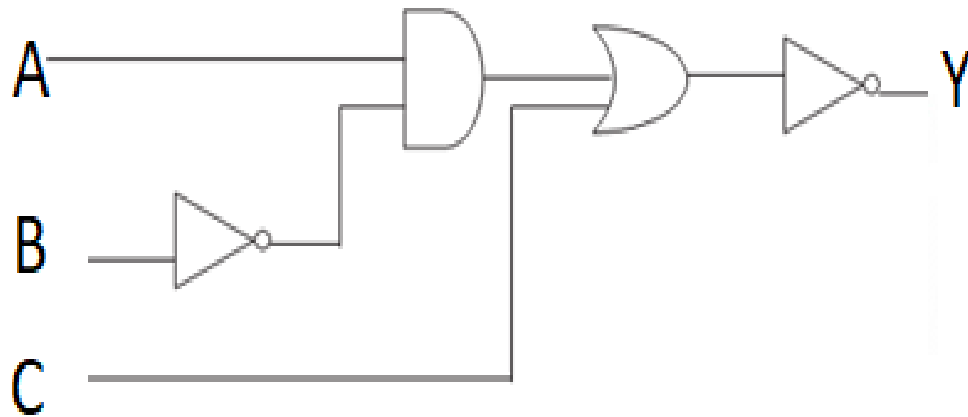
A	B	C	AB	Y	B+C	Y
0	0	0	0	0	0	0
0	0	1	0	1	1	0
0	1	0	0	0	1	0
0	1	1	0	1	1	0
1	0	0	0	0	0	0
1	0	1	0	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

$$Y = A * (B + C)$$

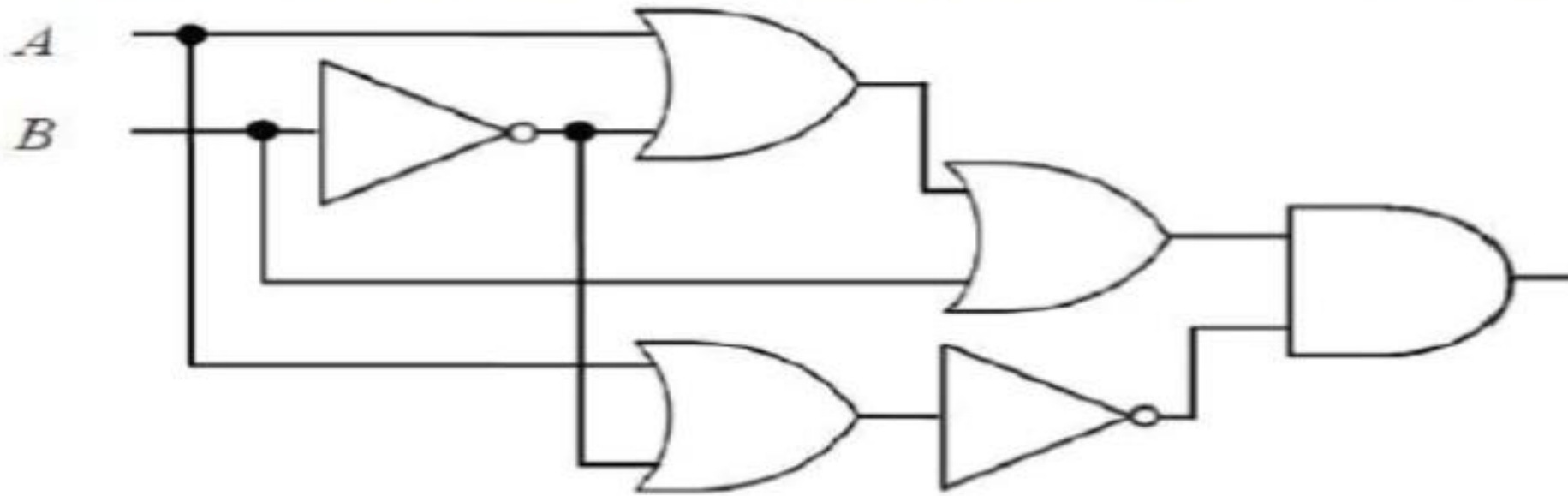


Nacrtati logičku shemu na osnovu logičkog izraza samo sa I; ILI; NE logičkim sklopovima

$$Y = \overline{(A \bullet \overline{B}) + C}$$



Koja je logička jednačžba sklopa prikazanoga na slici?

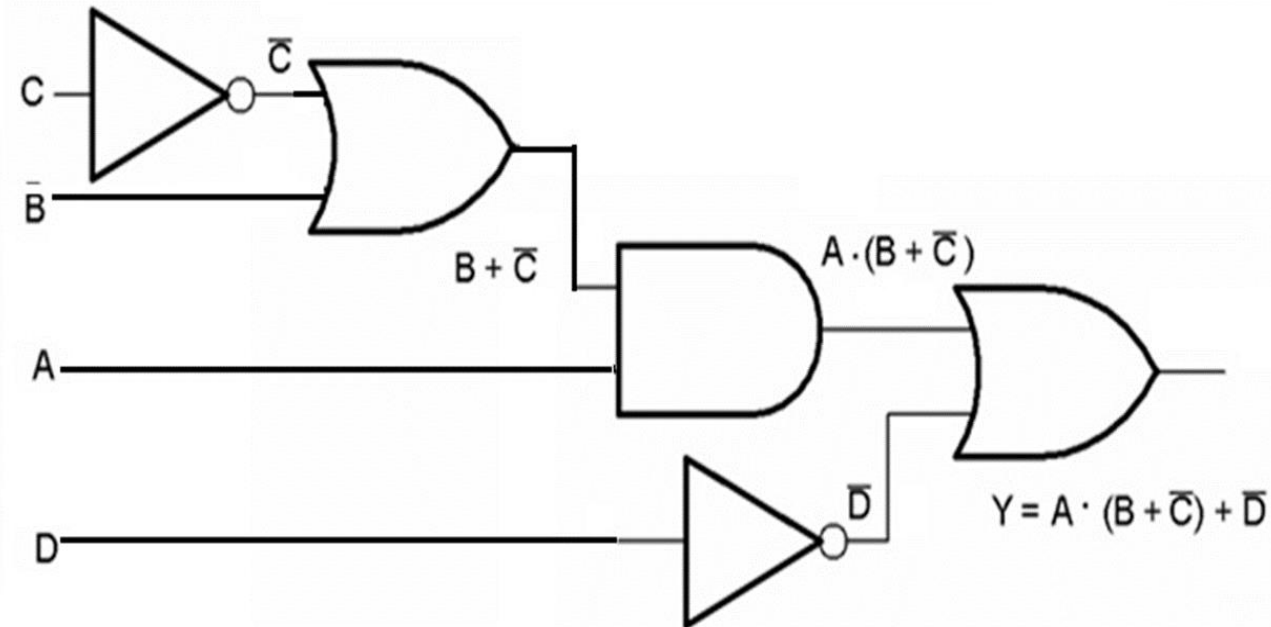


- A. $\overline{A} \cdot B + \overline{B} + \overline{\overline{A} \cdot \overline{B}}$
- B. $A + \overline{B} \cdot \overline{A} + \overline{\overline{A} \cdot \overline{B}}$
- C. $((A + \overline{B}) + B) \cdot \overline{\overline{A} + \overline{B}}$
- D. $((A \cdot \overline{B}) \cdot B) + \overline{\overline{A} \cdot \overline{B}}$

Točan odgovor: C

Nacrtati logičku shemu na osnovu logičkog izraza.

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



Zadaci za vježbu

- 1. Nacrtati logičke sheme na osnovu logičkih izraza, te napisati pripadajuće tablice stanja:
- a) $Y = A + B(A + \overline{B * C})$
- b) $Y = \overline{A * B} + A * C + \overline{B}$
- c) $Y = \overline{A} + B(\overline{A * B} + C) + \overline{A * B}$