Escola de Engenharia de São Carlos

Departamento de Engenharia Elétrica e de Computação

SEL 412 Tecnologia Digital

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GABARITO Lista nº1 : LÓGICA E CIRCUITOS DIGITAIS

1. Desenhar o diagrama lógico e a tabela de verdade das seguintes funções lógicas:

a) $S = A \cdot B \cdot C + (A + B) \cdot C$

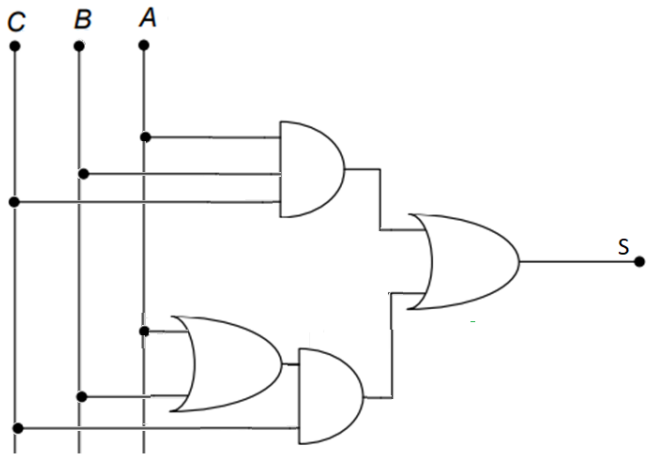
b) $S = \left[\overline{(\overline{A} \cdot B)} \cdot \overline{(\overline{C} + D)}\right] + \overline{D}$

c) $S = \left[\overline{(A \cdot B)} + \overline{(C \cdot D)}\right]$

RESPOSTAS:

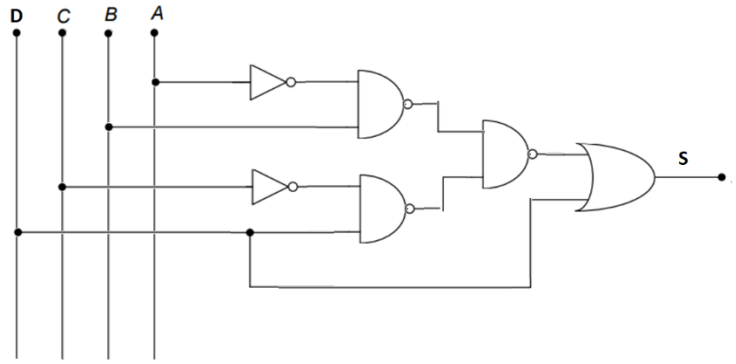
a) $S = A \cdot B \cdot C + (A + B) \cdot C$

A	B	C	A.B.C	A+B	(A+B)C	S
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	1	0	0
0	1	1	0	1	1	1
1	0	0	0	1	0	0
1	0	1	0	1	1	1
1	1	0	0	1	0	0
1	1	1	1	1	1	1



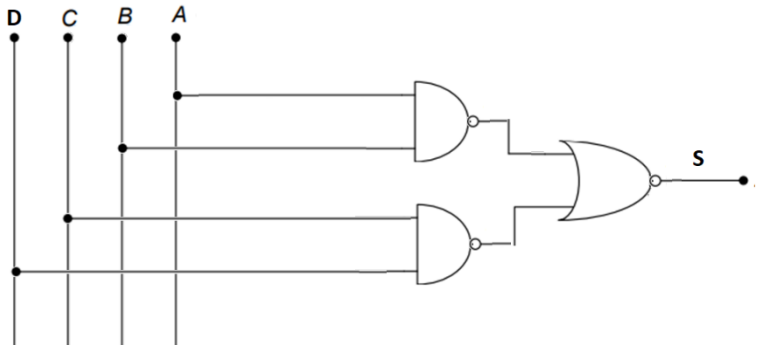
b) $S = \left[\overline{(\overline{A \cdot B}) \cdot (\overline{C + D})}\right] + \overline{D}$

A	B	C	D	/A	/A.B	/(/A.B)	/C	/C+D	/(/C+D)	/(/A.B). /(/C+D)	/(/(/A.B). /(/C+D))	/D	S
0	0	0	0	1	0	1	1	0	1	1	0	1	1
0	0	0	1	1	0	1	1	1	0	0	1	0	1
0	0	1	0	1	0	1	0	0	1	1	0	1	1
0	0	1	1	1	0	1	0	0	1	1	0	0	0
0	1	0	0	1	1	0	1	0	1	0	1	1	1
0	1	0	1	1	1	0	1	1	0	0	1	0	1
0	1	1	0	1	1	0	0	0	1	0	1	1	1
0	1	1	1	1	1	0	0	0	1	0	1	0	1
1	0	0	0	0	0	1	1	0	1	1	0	1	1
1	0	0	1	0	0	1	1	1	0	0	1	0	1
1	0	1	0	0	0	1	0	0	1	1	0	1	1
1	0	1	1	0	0	1	0	0	1	1	0	0	0
1	1	0	0	0	0	1	1	0	1	1	0	1	1
1	1	0	1	0	0	1	1	1	0	0	1	0	1
1	1	1	0	0	0	1	0	0	1	1	0	1	1
1	1	1	1	0	0	1	0	0	1	1	0	0	0



c) $S = \left[\overline{(A \cdot B) + (C \cdot D)}\right]$

A	B	C	D	/A	A.B	/(A.B)	C.D	/(C.D)	/(A.B)+ /(C.D)	S
0	0	0	0	1	0	1	0	1	1	0
0	0	0	1	1	0	1	0	1	1	0
0	0	1	0	1	0	1	0	1	1	0
0	0	1	1	1	0	1	1	0	1	0
0	1	0	0	1	0	1	0	1	1	0
0	1	0	1	1	0	1	0	1	1	0
0	1	1	0	1	0	1	0	1	1	0
0	1	1	1	1	0	1	1	0	1	0
1	0	0	0	0	0	1	0	1	1	0
1	0	0	1	0	0	1	0	1	1	0
1	0	1	0	0	0	1	0	1	1	0
1	0	1	1	0	0	1	1	0	1	0
1	1	0	0	0	1	0	0	1	1	0
1	1	0	1	0	1	0	0	1	1	0
1	1	1	0	0	1	0	0	1	1	0
1	1	1	1	0	1	0	1	0	0	1



2. Demonstrar que:

a) $\overline{A} \cdot \overline{B} \neq \overline{A \cdot B}$

b) $\overline{A} + \overline{B} \neq \overline{A + B}$

c) $\overline{\overline{A} \cdot \overline{B} + A \cdot B} = A \oplus B$

d) $\left(\overline{\overline{A} + A \cdot B}\right) + \left(\overline{\overline{B} + A \cdot B}\right) = A \otimes B$

Resposta:

a) $\overline{A} \cdot \overline{B} \neq \overline{A \cdot B}$

B	A	A.B	/(A.B)	/A	/B	/A./B
0	0	0	1	1	1	1
0	1	0	1	0	1	0
1	0	0	1	1	0	0
1	1	1	0	0	0	0

Resultados diferentes

b) $\overline{A}+\overline{B} \neq \overline{A+B}$

B	A	A+ B	/(A+B)	/A	/B	/A+/B
0	0	0	1	1	1	1
0	1	1	0	0	1	1
1	0	1	0	1	0	1
1	1	1	0	0	0	0

Resultados diferentes

c) $\overline{\overline{A}\cdot\overline{B}+A\cdot B} = A \oplus B$

B	A	A⊕B	A.B	/A	/B	/A./B	(/A./B)+ (A.B)	/[(/A./B)+ (A.B)]
0	0	0	0	1	1	1	1	0
0	1	1	0	0	1	0	0	1
1	0	1	0	1	0	0	0	1
1	1	0	1	0	0	0	1	0

Resultados iguais

d) $\overline{\left(\overline{\overline{A}+A\cdot B}\right)+\left(\overline{\overline{B}+A\cdot B}\right)} = A \otimes B$

B	A	A.B	/A	/A + A.B	/(/A + A.B)	/B	/B + A.B	/(/B + A.B)	/(/A + A.B) + /(/B + A.B)	A⊕B
0	0	0	1	1	0	1	1	0	0	0
0	1	0	0	0	1	1	1	0	1	1
1	0	0	1	1	0	0	0	1	1	1
1	1	1	0	1	0	0	1	0	0	0

Resultados iguais

3. Para as funções lógicas caracterizadas pelas tabelas de verdade abaixo: obter as funções lógicas e : desenhar os diagramas lógicos.

a)

A	B	S_1	S_2
0	0	0	0
0	1	1	0
1	0	1	1
1	1	0	1

b)

A	B	S_1	S_2
0	0	0	1
0	1	1	0
1	0	0	0
1	1	1	1

c)

A	B	C	S_1	S_2
0	0	0	1	0
0	0	1	1	0
0	1	0	0	0
0	1	1	0	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	1
1	1	1	0	0

d)

A	B	C	S_1	S_2
0	0	0	0	0
0	0	1	1	0
0	1	0	1	1
0	1	1	1	0
1	0	0	0	0
1	0	1	1	0
1	1	0	0	1
1	1	1	0	0

RESPOSTAS:

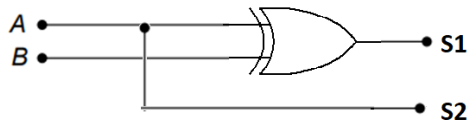
a)

A	B	S_1	S_2
0	0	0	0
0	1	1	0
1	0	1	1
1	1	0	1

S1 = /A.B + /B.A = A$\oplus$ B

S2 = A./B + A.B = A(B + /B) = A

Circuito:



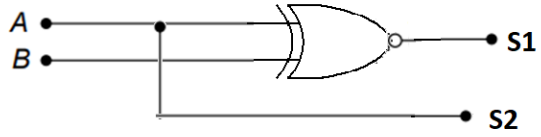
b)

A	B	S_1	S_2
0	0	0	1
0	1	1	0
1	0	0	0
1	1	1	1

S1 = /A.B + A.B = /(A$\oplus$ B)

S2 = /A./B + A.B = A(B + /B) = A

Circuito:



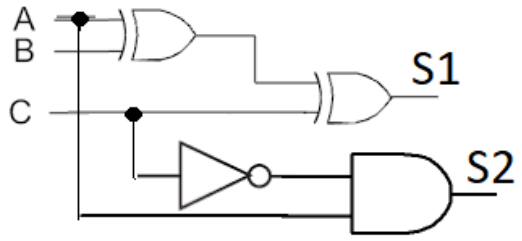
c)

A	B	C	S_1	S_2
0	0	0	1	0
0	0	1	1	0
0	1	0	0	0
0	1	1	0	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	1
1	1	1	0	0

S1 = /A./B./C + /A./B.C + A./B .C + A.B./C = /A(B$\oplus$ C) + A (B$\oplus$C)= A $\oplus$B $\oplus$ C

S2 = A./B ./C + A.B. /C = A. /C (/B + B) = A./C

Circuito:



d)

A	B	C	S_1	S_2
0	0	0	0	0
0	0	1	1	0
0	1	0	1	1
0	1	1	1	0
1	0	0	0	0
1	0	1	1	0
1	1	0	0	1
1	1	1	0	0

S1 = /A./B.C + /A.B./C + /A.B .C + A./B.C = /B.C (/A + A) + /A.B(/C + C) = /B.C + /A .B

S2 = /A.B ./C + A.B. /C = /C (/AB + AB) =

Circuito: