

CIRCUITOS DIGITAIS I – CP : TERCEIRA AVALIAÇÃO

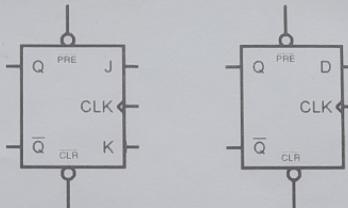
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Data 05/08/25

IMPORTANTE: Em qualquer desenvolvimento, de qualquer questão, desta prova, os valores lógicos de variáveis devem ser: VERDADEIRO= 1 e FALSO= 0 seguindo o padrão do Livro Texto.

Blocos Lógicos disponíveis:



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- 1- Usando FlipFlops tipo JK, desenvolver todas as etapas de projeto mínimo de um contador síncrono que apresenta a sequência de contagem: $0 \rightarrow 1 \rightarrow 6 \rightarrow 5 \rightarrow 7 \rightarrow 0$.

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- 2- Analisar o circuito digital da Figura-1 através de uma **Tabela de Teste de Estados, completa**, e elaborar o respectivo **Diagrama de Transição de Estados, completo**.

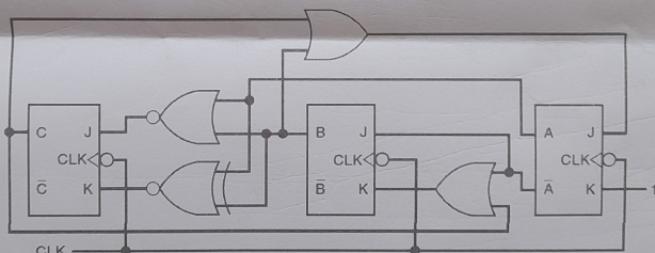


Figura-1

$$\begin{aligned} J_C &= \bar{B} + \bar{K} \\ K_C &= \bar{B} \cdot \bar{A} \\ J_B &= \bar{A} \\ K_B &= C + \bar{A} \\ J_A &= C + B \\ K_A &= 1 \end{aligned}$$

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- 3- Desenvolver, com o mínimo de FlipFlops e portas lógicas, um circuito, **completo**, para o sequenciador da Figura-2.

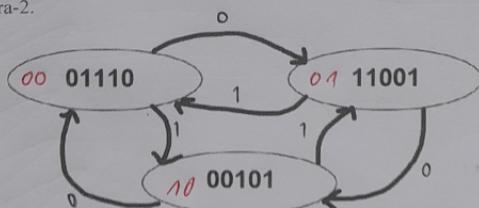
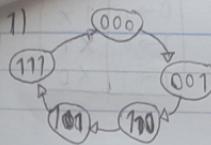


Figura-2



• Transistor de Jk:

CBA	C'B'A'	J C K C	J B K B	J A K A
0 0 0	0 0 1	0 X	0 X	1 X
1 0 0	1 1 0	1 X	1 X	X 1
0 1 0	1 0 1	X 0	X 1	1 X
1 1 0	0 1 1	X 0	1 X	X 0
0 1 1	0 0 0	X 1	X 1	X 1
1 1 1				

$$\begin{aligned} 0 \rightarrow 0 & \quad \text{JC} = AC \\ 0 \rightarrow 1 & \quad \text{KC} = BA \\ 1 \rightarrow 0 & \quad \text{JB} = A \\ 1 \rightarrow 1 & \quad \text{KA} = 1 \\ 1 & \quad \text{RB} = 1 \\ & \quad \text{JA} = 1 \\ & \quad \text{KA} = \bar{C} + B \\ & \quad \text{KC} = BA \end{aligned}$$

1 1

Tabella di tutta:

CBA	J C K C	J B K B	J A K A	C'B'A'
0 1 0	0 0 0	1 1 1	1 1 1	0 0 1
0 1 1	1 1 1	1 1 1	1 1 1	1 0 0
1 0 0	0 0 0	1 1 0	1 1 0	1 1 1

2 → 1

3 → 4

4 → 7

$$JC = A$$

CBA	J C K C	J B K B	J A K A
0 0 0	0 0 1	1 1 1	1 1 1
0 0 1	1 1 0	0 0 0	0 0 1
0 1 0	0 1 1	0 0 1	0 0 0

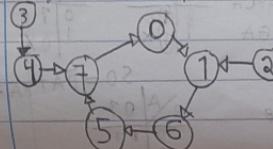
CBA	J C K C	J B K B	J A K A
0 0 0	0 0 1	1 1 1	1 1 1
0 0 1	1 1 0	0 0 0	0 0 1
0 1 0	0 1 1	0 0 1	0 0 0

$$JB = A$$

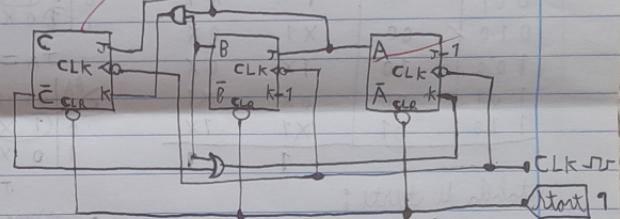
CBA	J C K C	J B K B	J A K A
0 0 0	0 0 1	1 1 1	1 1 1
0 0 1	1 1 0	0 0 0	0 0 1
0 1 0	0 1 1	0 0 1	0 0 0

CBA	J C K C	J B K B	J A K A
0 0 0	0 0 1	1 1 1	1 1 1
0 0 1	1 1 0	0 0 0	0 0 1
0 1 0	0 1 1	0 0 1	0 0 0

diagramma completo



circuito:

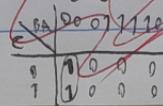
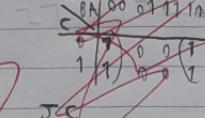
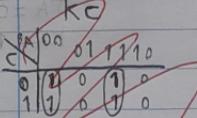


JA

Tabella di tutta:

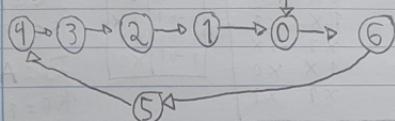
CBA	J C K C	J B K B	J A K A	C'B'A'
0 0 0	1 1 1	1 1 1	0 1	1 1 0
0 0 1	0 0 0	0 0 0	0 1	0 0 0
0 1 0	0 0 0	1 1 1	1 1 1	0 0 1
0 1 1	0 1 1	0 0 1	0 1 1 1	0 1 0
1 0 0	1 1 0	1 1 1	1 1 1	0 1 1
1 0 1	0 0 0	0 1 1	1 1 1	1 0 0
1 1 0	0 0 0	1 1 1	1 1 1	1 0 1
1 1 1	0 1 1	0 1 1	1 1 1	0 0 0

0 → 6
1 → 0
2 → 1
3 → 2
4 → 3
5 → 4
6 → 5
7 → 0



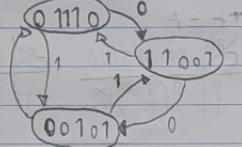
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• diagrama completo:



$0 \rightarrow 0$	0×0
$0 \rightarrow 1$	$1 \times$
$1 \rightarrow 0$	$\times 1$
$1 \rightarrow 1$	$\times 0$

3.)



spese de implementar el circuito se necesita una cantidad de flip-flops menor que la cantidad de estados.

BA	S4	S3	S2	S1	S0
00	0	1	1	1	0
01	1	1	0	0	1
10	0	0	1	0	1

$S4 = A$	$S3 = \bar{B}$
$S2 = A$	$S1 = \bar{B}$
$S0 = \bar{B}A + BA = BBA$	$= BAA$
$J_B = \bar{C}\bar{B} + C\bar{A}$	$J_A = \bar{C}B + CB$

• Tabla de verdad:

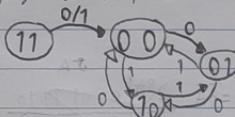
CBA	JBKB	JAKA	B'A'
000	01	0 X	1 X
001	10	1 X	X 1
010	00	X 1	0 X
100	10	1 X	0 X
101	00	0 X	X 1
110	01	X 1	1 X
		1	1

$J_B = \bar{C}\bar{B} + C\bar{A}$	$J_A = \bar{C}B + CB$
$S4 = A$	$S3 = \bar{B}$
$S2 = A$	$S1 = \bar{B}$
$S0 = \bar{B}A + BA = BBA$	$= BAA$
$C = 00011110$	$C = 110$
$0 = 011X$	$0 = 10$
$1 = 10X\bar{X}$	$1 = 1X$

• Tabla de verdad:

CBA	JBKB	JAKA	B'A'
011	1101	00	
111	0111	00	

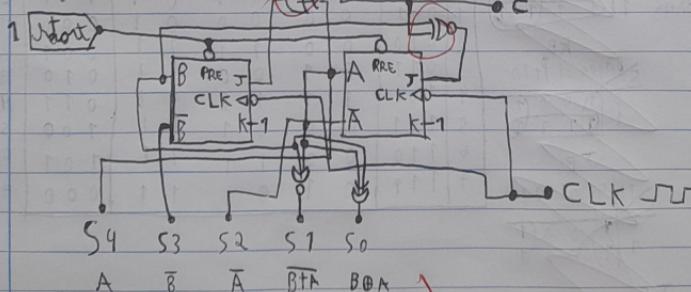
• diagrama completo:



$$S4 = A$$

$$S3 = \bar{B}$$

• circuito:



$$S2 = \bar{B}A$$

$$S1 = \bar{B}A$$

$$S0 = BAA$$

$$= BAA$$

$$J_B = CBA$$

$$K_B = 1$$

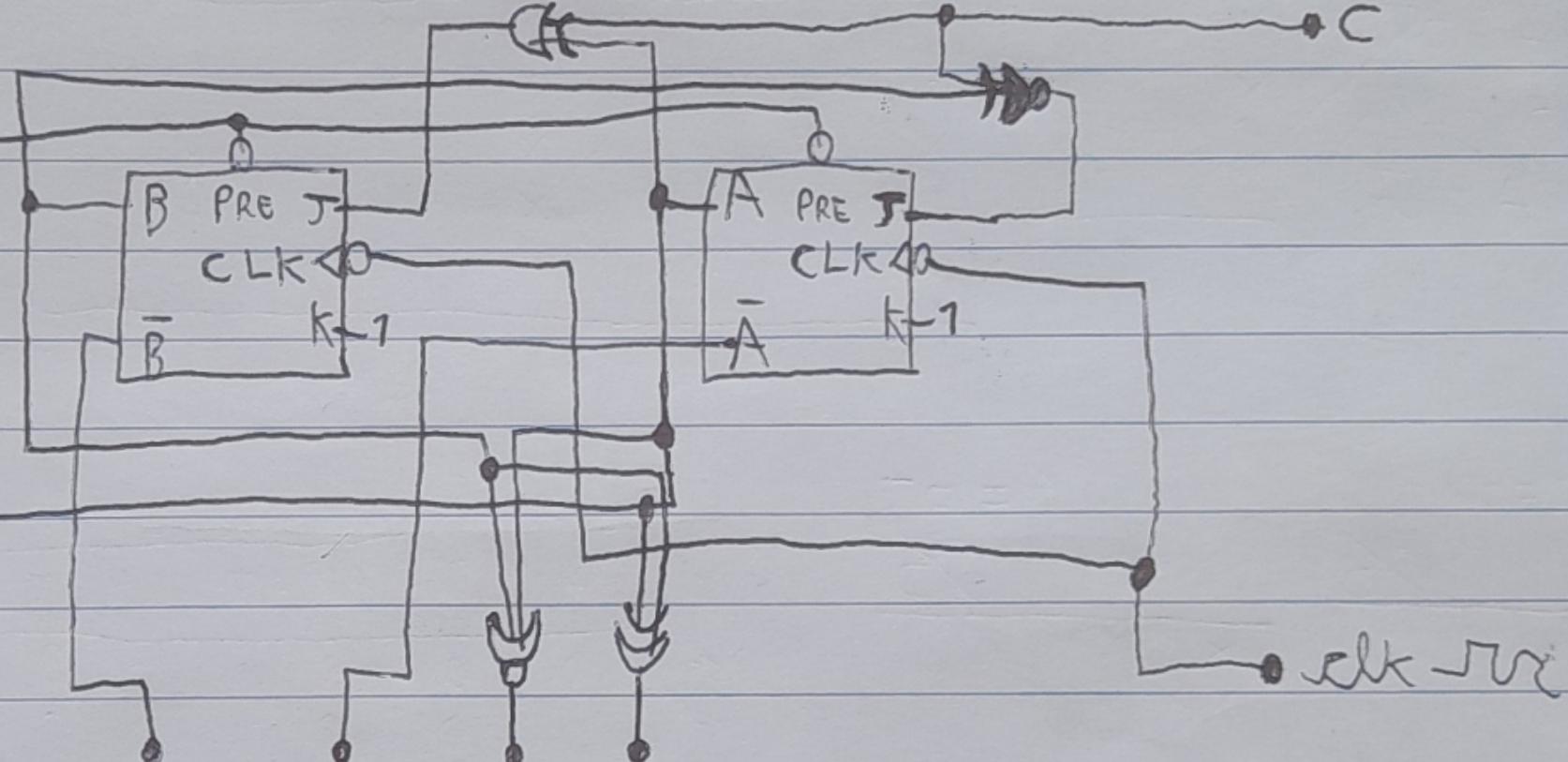
$$J_A = \bar{C}B$$

$$K_A = 1$$

• Crants:

1

Start



S4 S3 S2 S1 S0