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① We have truth table: $C < D : 1$ $C \geq D : 0$

C_1	C_0	d_1	d_0	y
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

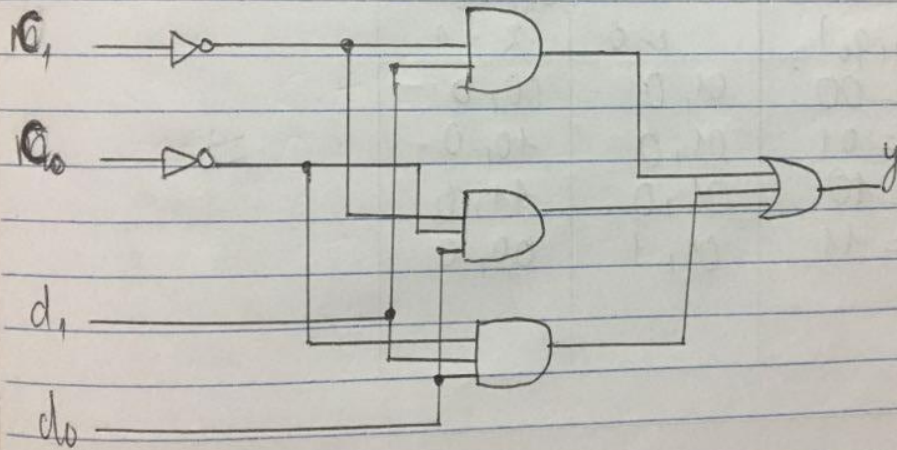
Karnaugh table:

$C_1 C_0 \backslash d_1 d_0$	00	01	11	10
00	0	1	1	1
01	0	0	1	1
11	0	0	0	0
10	0	0	1	0

Date . . .

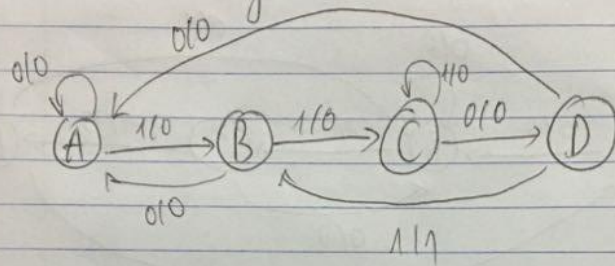
No.

$$y = \bar{c}_1 d_1 + \bar{c}_1 \bar{c}_0 d_0 + \bar{c}_0 d_1 d_0$$



(P) State diagram

② State diagram: 1101



State table:

PS	NS	
	x=0	x=1
A	A, 0	B, 0
B	A, 0	C, 0
C	D, 0	C, 0
D	A, 0	B, 1

A wait for 1st 1
 B has 1st 1, wait 2nd 1
 C has 2nd 1, wait 1st 0
 D has 0, wait 1.

1 state \Rightarrow 2 flip-flops are required to implement the circuit.

PS $q_1 q_2$	NS($Q_1 Q_2$)	
	$x=0$	$x=1$
A=00	00, 0	01, 0
B=01	00, 0	10, 0
C=10	11, 0	10, 0
D=11	00, 0	01, 1

q	Q	J	K
0	0	0	-
0	1	1	-
1	0	-	1
1	1	-	0

Excitation Table:

PS	NS		$x=0$			$x=1$		
	$x=0$	$x=1$	J_1	$\bar{J}_1 K_1$	z	$J_2 K_2$	$\bar{J}_2 K_2$	z
00	00	01	0-	0-	0	0-	1-	0
01	00	10	0-	-1	0	1-	-1	0
10	11	10	-0	1-	0	-0	0-	0
11	00	01	-1	-1	0	-1	-0	1

Karnaugh Table:

J_1

$x \backslash q_1 q_2$	00	01	11	10
0	0	0	-	-
1	0	1	-	-

$$J_1 = xq_2$$

K_1

$x \backslash q_1 q_2$	00	01	11	10
0	-	-	1	0
1	-	-	1	0

$$K_1 = q_2$$

J_2

$x \backslash q_1 q_2$	00	01	11	10
0	0	-	1	1
1	1	-	-	0

$$J_2 = \bar{q}_1 x + q_1 \bar{x}$$

K_2

$x \backslash q_1 q_2$	00	01	11	10
0	-	1	1	-
1	-	1	0	-

$$K_2 = \bar{q}_1 + \bar{x}$$

Output

$x \backslash q_1 q_2$	00	01	11	10
0	0	0	0	0
1	0	0	1	0

$$z = q_1 q_2 x$$

Date

No.

