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Date: ___/___/20___

Name:

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Roll No:

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Section:

BSCS-2D.

Up and Down counter for first 4 odd numbers:

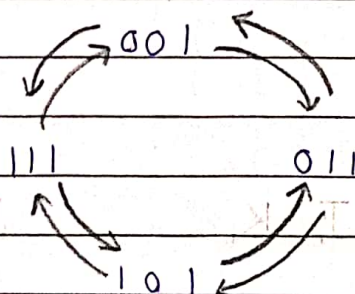
First 4 odd numbers: 1, 3, 5, 7

1 = 001

3 = 011

5 = 101

7 = 111



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y	Q ₂	Q ₁	Q ₀	Q ₂	Q ₁	Q ₀
0	0	0	0	1	1	1
0	0	0	1			
0	0	1	0			
0	0	1	1	0	0	1
0	1	0	0			
0	1	0	1	0	1	1
0	1	1	0			
0	1	1	1	1	0	1

Transition Table:

y = 0 (Down)

J ₂ K ₂	J ₁ K ₁	J ₀ K ₀
1 X	1 X	X 0
0 X	X 1	X 0
X 1	1 X	X 0
X 0	1 X	X 0

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 $y = 1$ (Up) J_2, K_2 J_1, K_1 J_0, K_0

0 X

1 X

X 0

1 X

X 1

X 0

X 0

1 X

X 0

X 1

X 1

X 0

K-Map for (J_2):

$J_2 \backslash Q_2$	00	01	11	10
00		1	0	
01		X	X	
11			X	
10			1	

$$J_2 = \bar{y} \bar{Q}_1 Q_0 + y Q_1 Q_0$$

K-Map for (K_2):

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$y Q_2 \backslash Q_1 Q_0$	00	01	11	10
00		X	X	
01		1	0	
11		X	1	
10		X	X	

$$K_2 = \bar{y} \bar{Q}_1 Q_0 + y Q_1 Q_0$$

K-Map for (J_1) :

$y Q_2 \backslash Q_1 Q_0$	00	01	11	10
00		1	X	
01		1	X	
11		1	X	
10		1	X	

$$J_2 = Q_0$$

K-Map for (K_2)

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$Q_1 Q_0$	00	01	11	10
00		X	1	
01		X	X	
11		X	1	
10		X	1	

$$K_1 = Q_0$$

K-Map for (J_0) :

$Q_1 Q_0$	00	01	11	10
00		X	X	
01		X	X	
11		X	X	
10		X	X	

$$J_0 = 0$$

K-Map for (K_0) :

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$Q_1 Q_0$				
$y Q_2$	00	01	11	10
00		0	0	
01		0	0	
11		0	0	
10		0	0	

$$K_0 = 0$$

Logical Expression:

For J :

$$i) J_2 = \bar{y} \bar{Q}_1 Q_0 + y Q_1 Q_0 \Rightarrow Q_0 (y \oplus Q_1)$$

$$ii) J_1 = Q_0$$

$$iii) J_0 = 0$$

For K :

$$i) K_2 = \bar{y} \bar{Q}_1 Q_0 + y Q_1 Q_0 \Rightarrow Q_0 (\overline{y \oplus Q_1})$$

$$ii) K_1 = Q_0$$

$$iii) K_0 = 0$$

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Circuit:

