

Assignment 11-Presentation

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Overview

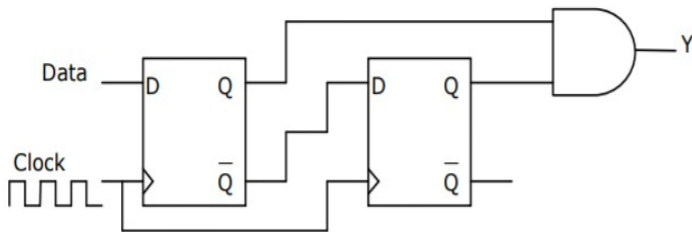
1 Question

2 Solution

- Introduction
- Expressions
- State Transition Diagram
- State Transition Table
- Table
- Answer

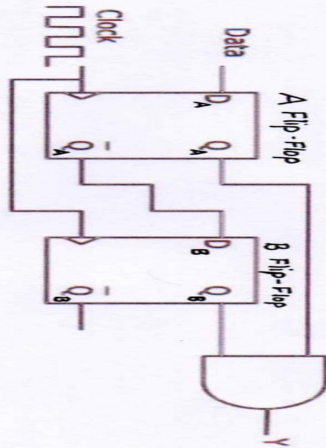
Question GATE EC 2011-19

When the output Y in the circuit below is '1', it implies that the data has



- (A) changed from 0 to 1
- (B) changed from 1 to 0
- (C) changed in either direction
- (D) not changed

Solution



Figure

Solution

In this problem there are two D-flip flops and one and gate. The output of and gate is Y which is the output of the above sequential circuit.

For our convenience let us take the first flip flop as A flip flop and second flip flop as B flip flop.

For A flip flop

- Input is D_A
- Outputs are Q_A and $\overline{Q_A}$

For B flip flop

- Input is D_B
- Outputs are Q_B and $\overline{Q_B}$

Now we need to find out the change in data when output Y is equal to 1.

Solution

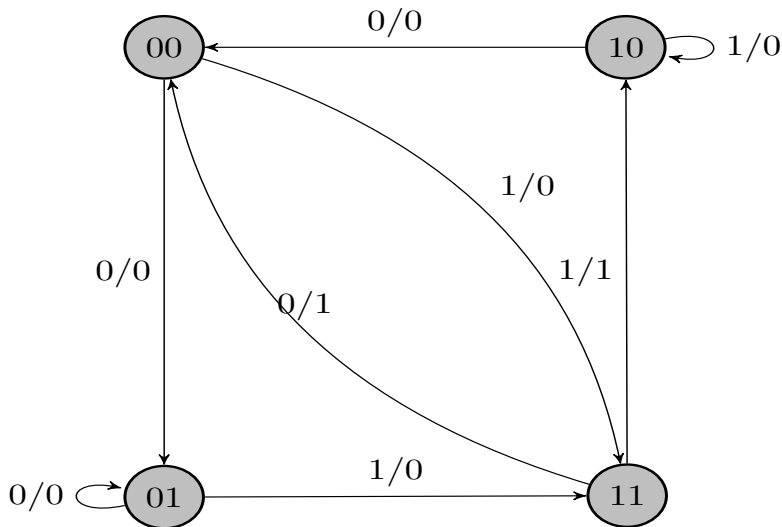
From the figure , it is clear that

$$Q_A = D_A = Data \quad (1)$$

$$Q_B = D_B = \overline{Q_A} \quad (2)$$

$$Y = Q_A \cdot Q_B \quad (3)$$

Solution



Solution

TABLE 2					
Present state		Data	Next state		Y
Q_A	Q_B		Q_A^*	Q_B^*	
0	0	0	0	1	0
0	0	1	1	1	0
0	1	0	0	1	0
0	1	1	1	1	0
1	0	0	0	0	0
1	0	1	1	0	0
1	1	0	0	0	1
1	1	1	1	0	1

Solution

Clock	Data	Q_A	Q_B
-		0	0
1st Pulse	D_1	D_1	1
2nd Pulse	D_2	D_2	$\overline{D_1}$

- When the clock is not given to the flip flops then Q_A and Q_B will remain in their reset state
- For the first clock pulse , we give the data as D_1
 - From equation (1) we get $Q_A = \text{Data}$. Since data = D_1 , $Q_A = D_1$
 - From equation (2) we get $Q_B = \overline{Q_A}$. Since $Q_A = 0$, $Q_B = 1$
- For the second clock pulse , we give the data as D_2
 - From equation (1) we get $Q_A = \text{Data}$. Since data = D_2 , $Q_A = D_2$
 - From equation (2) we get $Q_B = \overline{Q_A}$. Since $Q_A = D_1$, $Q_B = \overline{D_1}$

Solution

Now we will generalise the case

- The output of first flip flop Q_A is equal to *present data*
- The output of second flip flop Q_B is equal to compliment of *previous data*

We know that $Y = Q_A \cdot Q_B$

This means $Y = (\text{present data}) \cdot (\overline{\text{previous data}})$

So the output of Y is equal to 1 only when the present data is equal to

0. So the data must change from 0 to 1.

In this way option (A) is the correct answer

Thank you for watching

The End