ECE111|Digital Circuits
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Lab_8:
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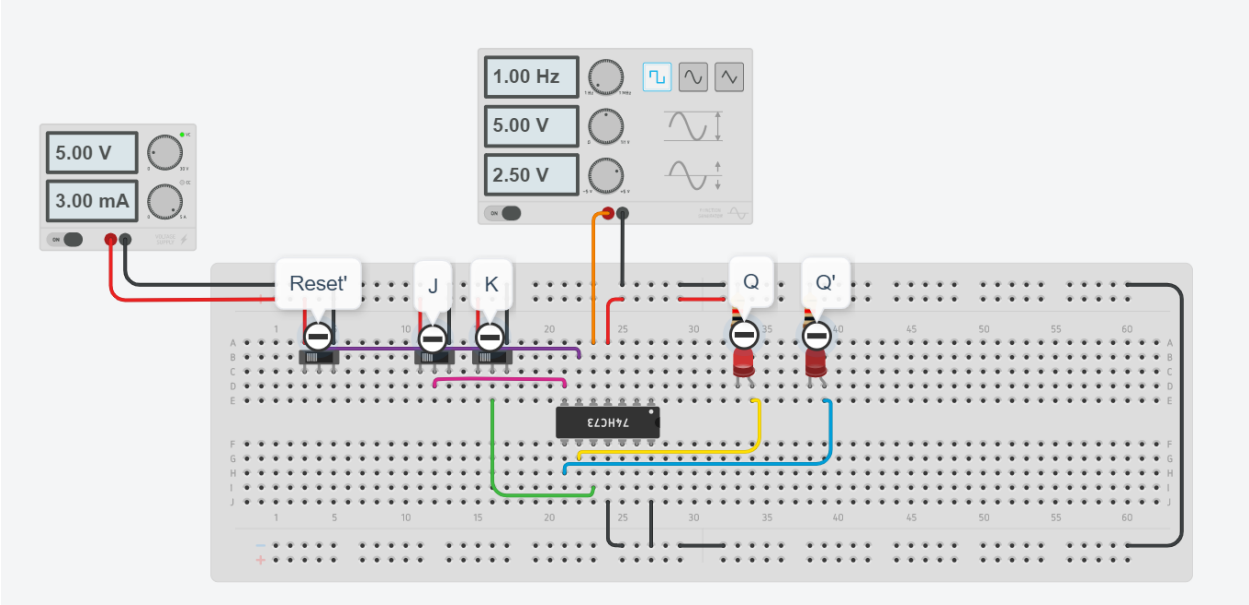
AIM 1 :Observing outputs of a JK flip-flop on different inputs

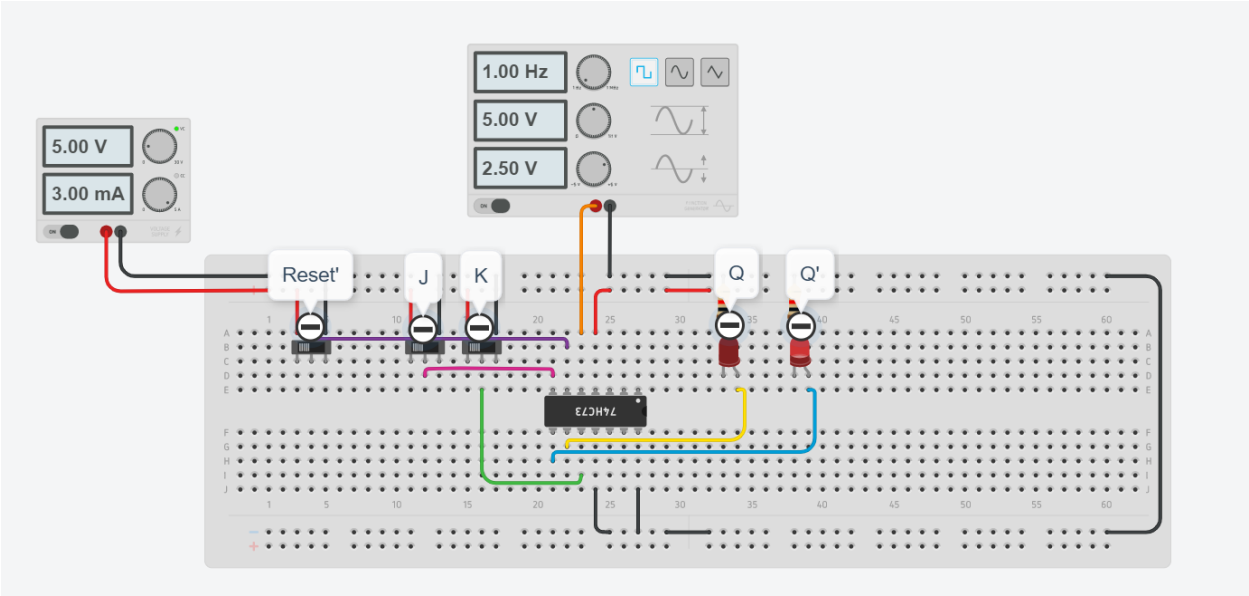
Components Used : 1 power supply , 2 resistors , 2 LEDs , 3 slide switches, 1 Dual J-K flip-flop(74HC73) , 1 Square Function Generator

TinkerCad Link :

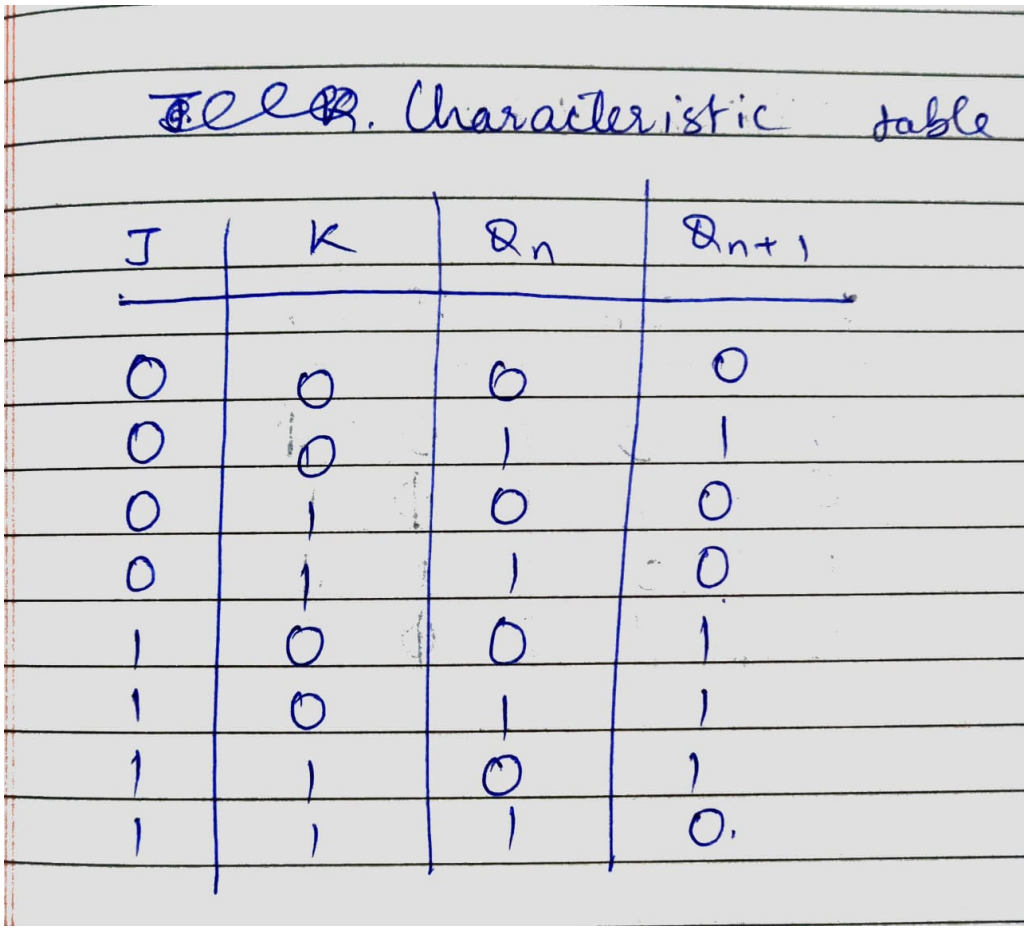
https://www.tinkercad.com/things/01AaQdhZuIn-jk-flip-flop/editel?sharecode=F37iFQssv2jKk22veNKv0wzzyHzLnZvifkdLX7qpEz4

Screenshots :





Characteristics Table :



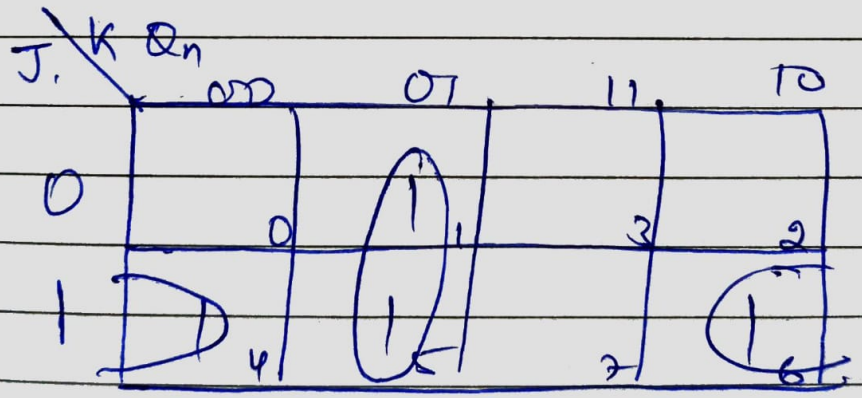
JK Flip Flop Characteristic table

J	K	Q_n	Q_{n+1}
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

Characteristics Equation :

Characteristic equation.

$Q_{n+1} = \Sigma m(1,4,5,6)$



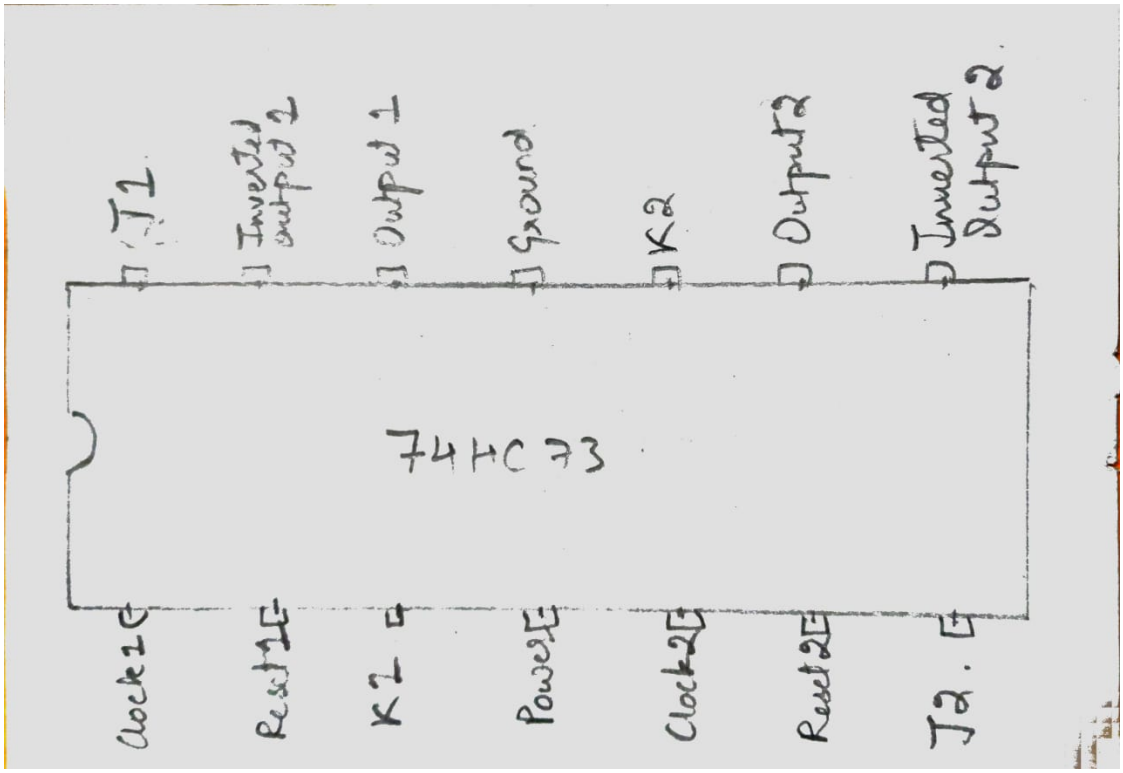
$Q_{n+1} = \bar{K} \cdot Q_n + J \cdot \bar{Q}_n$

Excitation Table :

Excitation table.

Q_{n+1}	Q_n	J	K
0	0	0	ϕ
0	1	ϕ	1
1	0	1	ϕ
1	1	ϕ	0

IC pin digram :



Observations :

For reset' = 1

J	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**1**	**0**
K	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**1**
Q	**0**	**0**	**1**	**1**	**0**	**1**	**1**	**0**	**0**
Q'	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**1**

Applications :

1. It can be used to store a single bit as data and by increasing the number of flip-flops connected we can increase the storage size and form registers
2. It can be used to make counters depending on the number of flip-flops connected

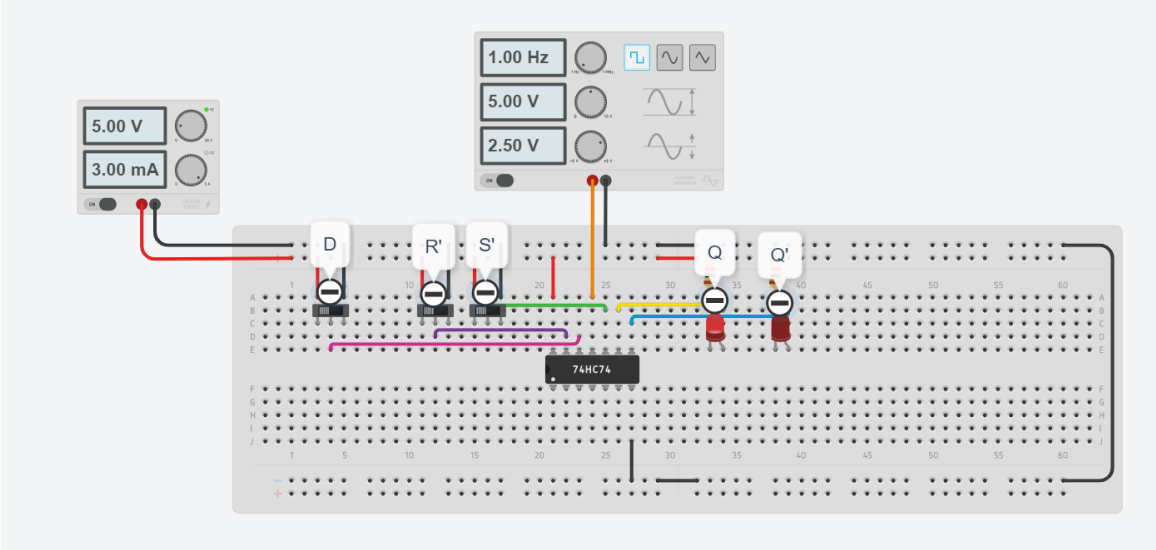
AIM 2 : Observing outputs of a D flip-flop on different inputs

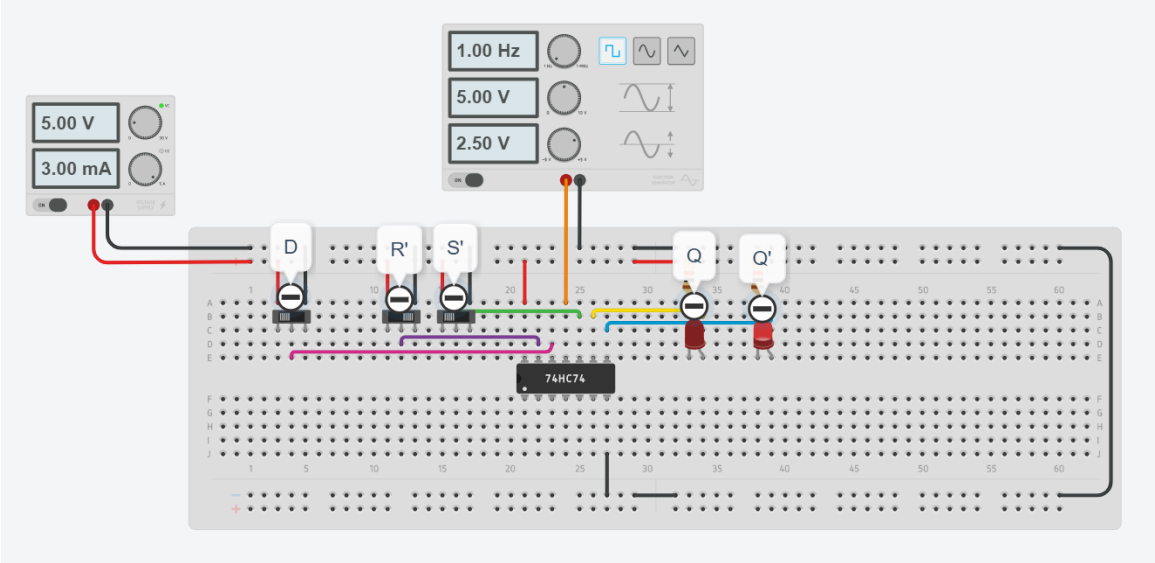
Components Used : 1 power supply , 2 resistors , 2 LEDs , 3 slide switches, 1 Dual D flip-flop(74HC74) , 1 Square Function Generator

TinkerCad Link :

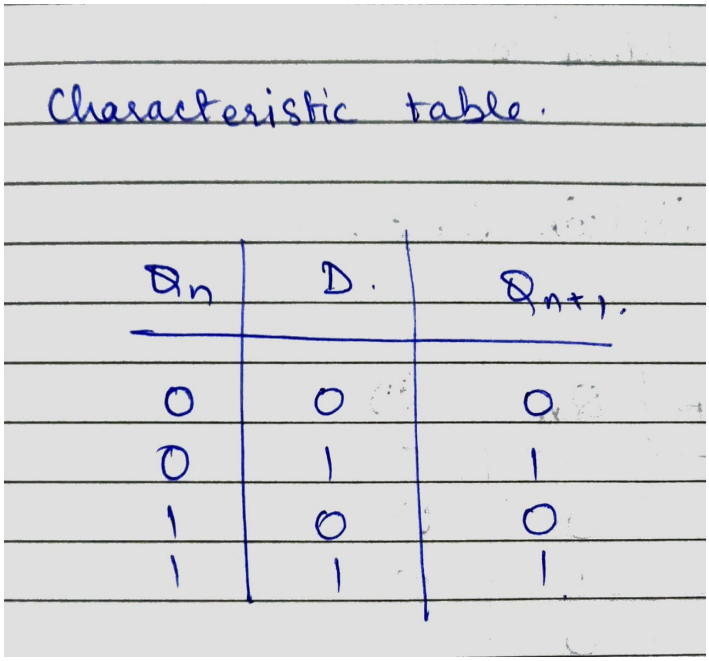
https://www.tinkercad.com/things/hClgeACUZtV-d-flip-flop/editel?sharecode=hnSVPvYu3sdxWYJ0Lq4sv1QvN4IveiO5rhOdmk67kzE

Screenshots :





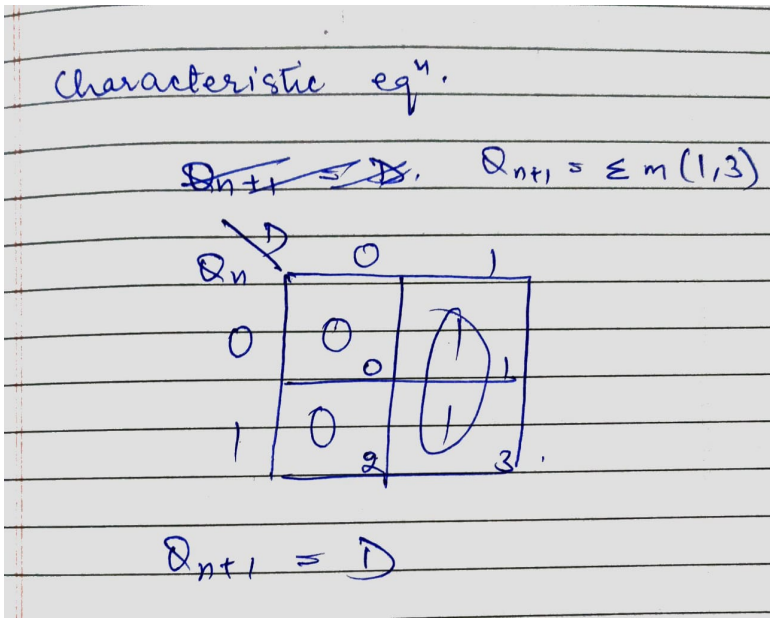
Characteristics Table :



Characteristic table.

Q_n	D.	Q_{n+1}.
0	0	0
0	1	1
1	0	0
1	1	1

Characteristics Equation :



Characteristic eq^n.

~~$Q_{n+1} = D$~~. $Q_{n+1} = \Sigma m(1,3)$

Q_n \ D	0	1
0	0 (0)	1 (1)
1	0 (2)	1 (3)

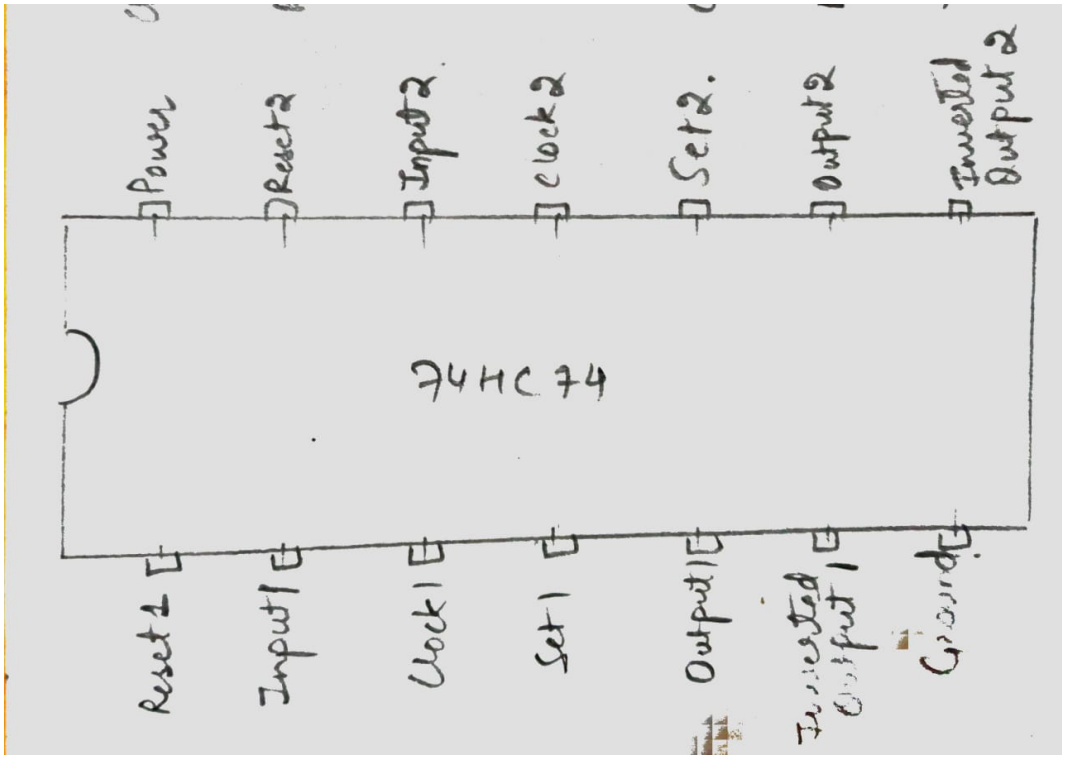
$Q_{n+1} = D$

Excitation Table :

Excitation table.

Q_{n+1}	Q_n	D
0	0	0
0	1	0
1	0	1
1	1	1.

IC pin digram :



Observations :

Set'	Reset'	D	Q	Q'
0	1	x	1	0
1	0	x	0	1
0	0	x	1	1
1	1	0	0	1
1	1	1	1	0

Applications :

1. Synchronous D flip-flops are used as data synchronizers
2. They can be used to create daley lines which are used in digital signal processing.