INSTITUTE OF INFORMATION TECHNOLOGY

JAHANGIRNAGAR UNIVERSITY

Number of Lab Report : 05

Name of Lab Report : Johnson counter with D flip-flop.

Course Tittle : Digital Logic Design Lab.

Course Code : ICT – 2104

Submission Date : 02/03/2021

Submitted To

Dr. Md. Sazzadur Rahman

Associate Professor

IIT – JU

Submitted By

Md. Shakil Hossain

Roll – 2023

2nd year 1st Semester

IIT – JU

Md. Shakil Hossain
Roll-2023

Experiment Name: Johnson Counter with D flip-flop.

Objectives:

1. To know how to make twisted ring counter.
2. To know how to store or count the number of events occurred in circuit.
3. To know advantage of Johnson Counter.

Theory:

The Johnson Ring Counter or twisted ring Counter is one shift register with feedback. In this Counter. the inverted output $\bar{Q}$ of the last flip-flop is Connected back to the input D of the first flip-flop as shown below

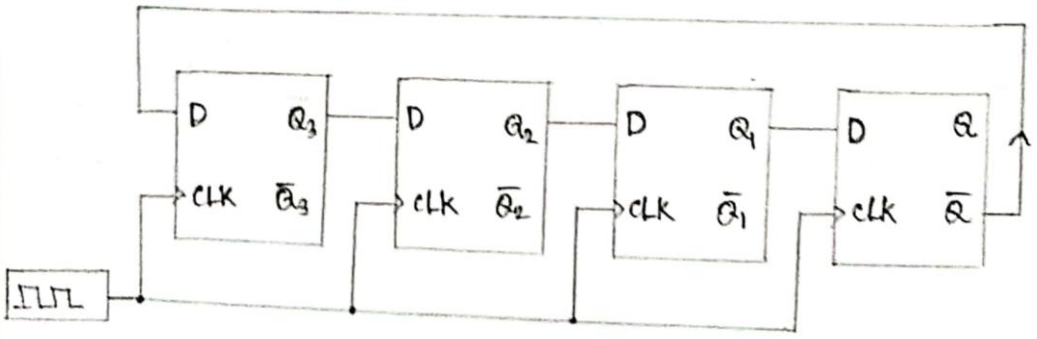

Fig: 4-bit Johnson Counter.

This inversion of Q before it is fedback to input D causes the Counter to 'Count' in a different way. Instead of Counting through a fixed set of Patterns like the normal ring Counter such as for a 4-bit Counter "0001", "0010", "0100", "1000" and repeat the Johnson Counter Counts up and then down as the initial logic "1" Passes through it to the right replacing the Preceding logic "0".

A 4-bit Johnson counter Passes blocks of four logic "0" and then four logic "1" thereby Producing an 8- bit Pattrn. As the inverted output $\bar{Q}$ is Connected to the input D this 8-bit Pattern Continually repeats. For example "1000", "1100", "1110", "1111", "0111", "0011", "0001", "0000" and this is demonstrated in the truth table.

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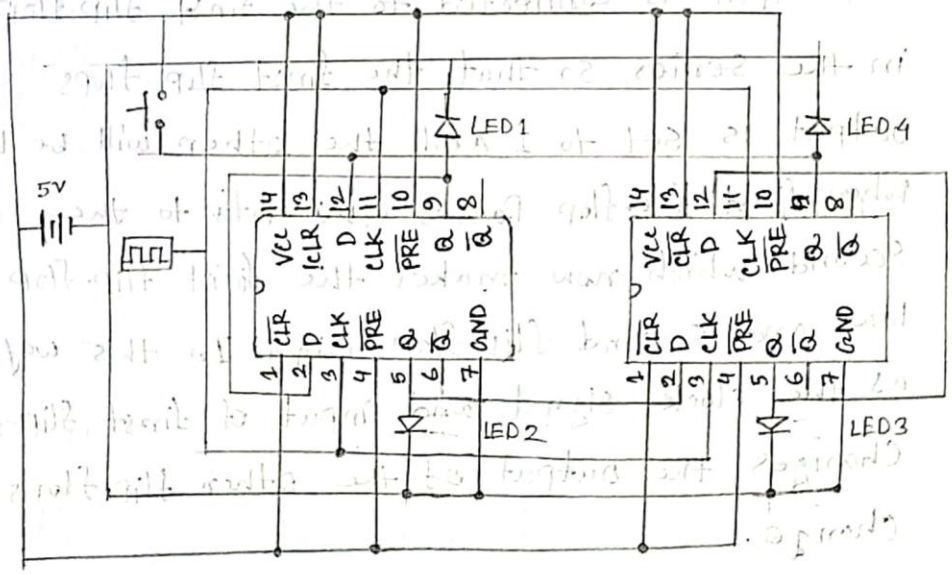
Apparatus:

1. Bread board
2. LED (4)
3. 7474 IC (4 Pcs)
4. Capasitor (1 μF)
5. Resistors (1M, 100K)
6. Connecting wires
7. Power Source.

Working Diagram:



Working Procedure:

In a 4-bit Johnson counter, the last flip-flop $\bar{Q}$ output is connected back to the D input of flip-flop 4, which means the inverse of the level stored in Q_0 will be transferred to Q_3 on the clock Pulse.

Here we place the components as the circuit diagram. Then Pass "+5 ve" as "1" in one flip-flop. In first round, the $\bar{Q_0}$ will be Passed to Q_4 through D input.

Result: Observed 4-bit ring counter:-

clock Pulse	Q_0	Q_1	Q_2	Q_3
0	0	0	0	0
1	1	0	0	0
2	1	1	0	0
3	1	1	1	0
4	1	1	1	1
5	0	1	1	1
6	0	0	1	1
7	0	0	0	1

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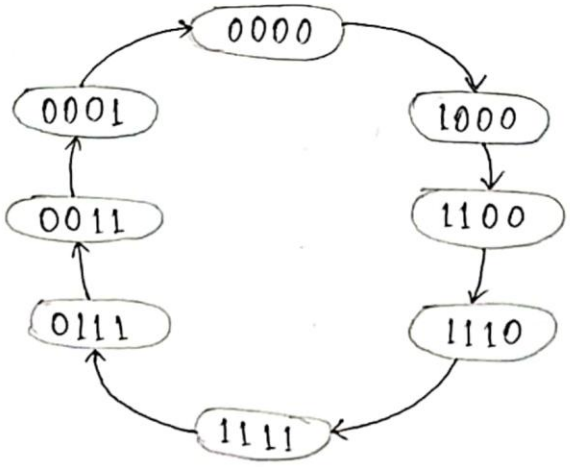
Sequence:



Reference:

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