INSTITUTE OF INFORMATION TECHNOLOGY

JAHANGIRNAGAR UNIVERSITY

Number of Lab Report : 06

Name of Lab Report : Mod-16 counter with JK flipflop.

Course Tittle : Digital Logic Design Lab

Course Code : ICT – 2104

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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: 16 Mod Counter

Objectives:

1. To know how to constract a mod-16 Counter
2. To know and study the operations of mod-16 Counter.

Theory:

Binary Counters are one of the applications of sequential logic using flip-flops. A Counter is a device which stores or displays the number of times a Particular event or Process has occured in form of clock Pulse. Counters can be formed by connecting individual flip-flops together. On application of pulses the flip-flops in the Counter undergo a change of state in such a manner that the binary number stored in the flip-flops represents the number of pulses applied at input.

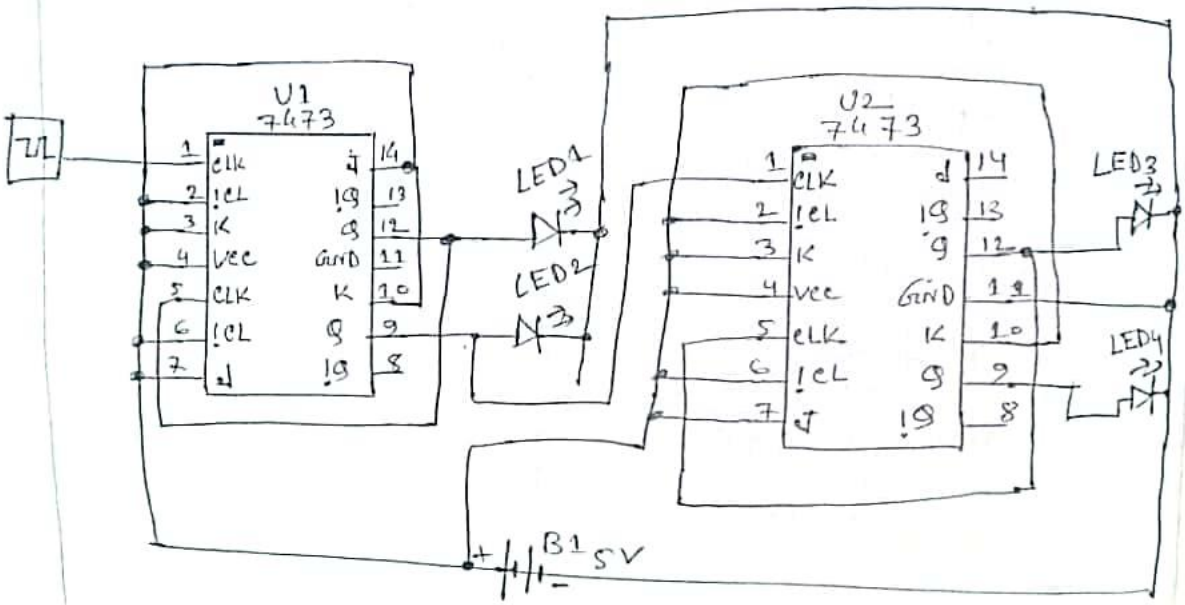
Modulus Counters or simply Mod Counters are defined based on the number of states that the Counter will sequence through before returning back to its original value.

To make a mod-16 counter it will require 4 flip-flops ($2^4=16$). The counter will show us 0000_2 to 1111_2 which will be 0 to 15 in decimal value.

Apparatus:

1. Bread board
2. Power Source
3. 2 IC 7473
4. Clock Pulses
5. LEDs
6. Connecting wires

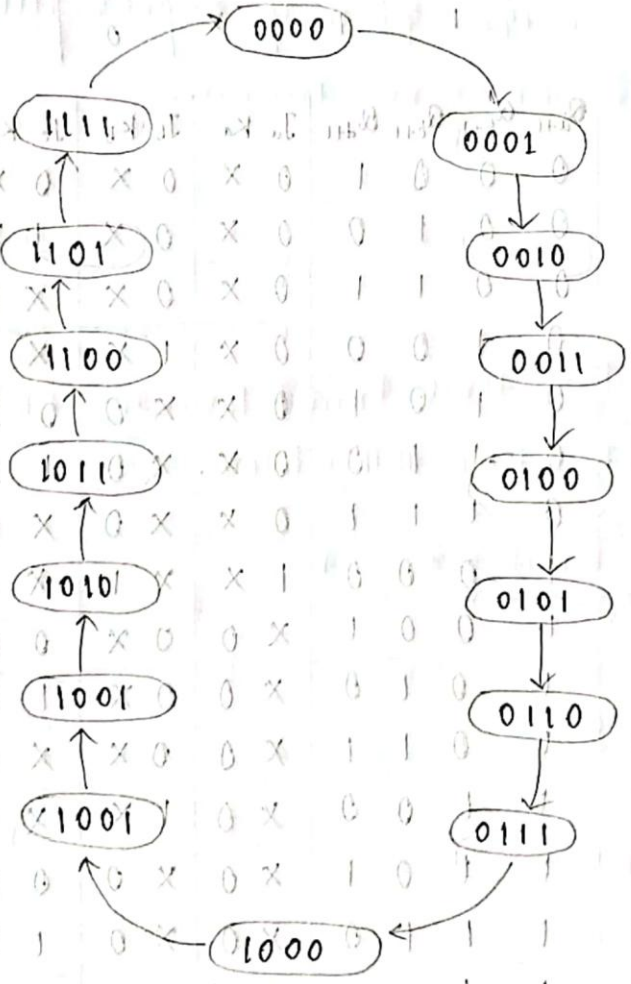
Circuit Diagram:



Result:

Number of flip-flops: 4

State Diagram:

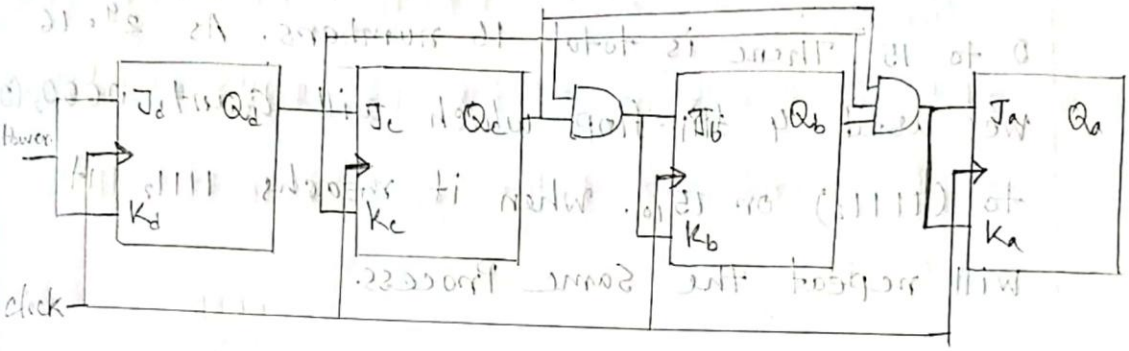


Excitation table:

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

Q_a	Q_b	Q_c	Q_d	Q_{a+1}	Q_{b+1}	Q_{c+1}	Q_{d+1}	J_a	K_a	J_b	K_b	J_c	K_c	J_d	K_d
0	0	0	0	0	0	0	1	0	x	0	x	0	x	1	x
0	0	0	1	0	0	1	0	0	x	0	x	1	x	x	1
0	0	1	0	0	0	1	1	0	x	0	x	x	0	1	x
0	0	1	1	0	1	0	0	0	x	1	x	x	1	x	1
0	1	0	0	0	1	0	1	0	x	x	0	0	x	1	x
0	1	0	1	0	1	1	0	0	x	x	0	1	x	x	1
0	1	1	0	0	1	1	1	0	x	x	0	x	0	1	x
0	1	1	1	1	0	0	0	1	x	x	1	x	1	x	1
1	0	0	0	1	0	0	1	x	0	0	x	0	x	1	x
1	0	0	1	1	0	1	0	x	0	0	x	1	x	x	1
1	0	1	0	1	0	1	1	x	0	0	x	x	0	1	x
1	0	1	1	1	1	0	0	x	0	1	x	x	1	x	1
1	1	0	0	1	1	0	1	x	0	x	0	0	x	1	x
1	1	0	1	1	1	1	0	x	0	x	0	1	x	x	1
1	1	1	0	1	1	1	1	x	0	x	0	x	0	1	x
1	1	1	1	0	0	0	0	x	1	x	1	x	1	x	1

Circuit implementation:



In the given circuit diagram this circuit has been implemented Properly. The LEDs shows 0 to 15 and then repeats the same Patterm.

Discussion:

The Counter is designed to Count from 0 to 15. There is total 16 numbers. As $2^4 = 16$ we used 4 flip-flop which will count $0000_2 (0_{10})$ to (1111_2) or 15_{10}. When it reaches 1111_2 it will repeat the same Process.

References:

1. Digital Systems Principles and Applications Ronald J. Tocci, 12th edition.
2. www.wikipedia.com.

THE END