CS220A: COMPUTER ORGANIZATION
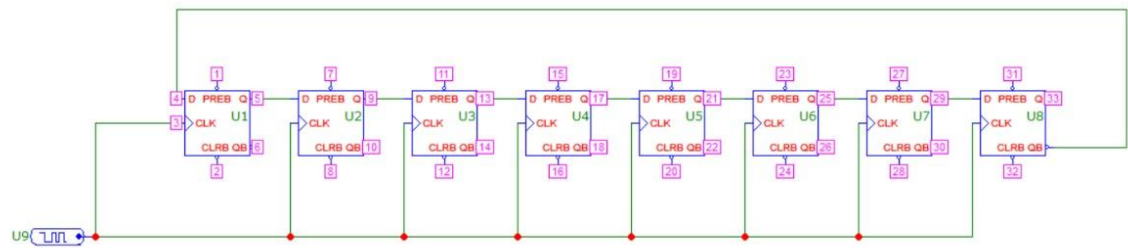
ASSIGNMENT - 2

Question - 2

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Circuit Diagram

Motivation

A Johnson Counter is a modified ring counter in which the inverted output of the last flip flop is given to the first flip flop and for every other flip flops, the output of the previous flip flop is given as input to the next one.

These can be used to make complicated Finite State Machines with ease. But, a N-bit Johnson Counter can only represent 2N states, whereas a binary counter can represent 2^N states.

Working

We make a D flip-flop module which gives input as its output when the clock is high. Now, we interconnect 8 D flip-flops among each other such that the inverted output of the last flip flop is given to the first flip flop and for every other flip flops, the output of the previous flip flop is given as input to the next one. These results are displayed as output. But when reset is high, then the output is set to 0, no matter what its previous output was.

Truth Table

Pulse Number	D8	D7	D6	D5	D4	D3	D2	D1
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	1
3	0	0	0	0	0	1	1	1
4	0	0	0	0	1	1	1	1

5	0	0	0	1	1	1	1	1
6	0	0	1	1	1	1	1	1
7	0	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	0
10	1	1	1	1	1	1	0	0
11	1	1	1	1	1	0	0	0
12	1	1	1	1	0	0	0	0
13	1	1	1	0	0	0	0	0
14	1	1	0	0	0	0	0	0
15	1	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0