SNS COLLEGE OF TECHNOLOGY
Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

19ECB231 – DIGITAL ELECTRONICS

II YEAR/ III SEMESTER

UNIT 4 – DESIGN OF SEQUENTIAL CIRCUITS

TOPIC –RING COUNTER

COUNTERS

- A **Counter** is a device which stores (and sometimes displays) the number of times a particular event or process has occurred, often in relationship to a clock signal.

- Counters are used in digital electronics for counting purpose, they can count specific event happening in the circuit.

- For example, in UP counter a counter increases count for every rising edge of clock.

COUNTERS

- Not only counting, a counter can follow the certain sequence based on our design like any random sequence 0,1,3,2… .They can also be designed with the help of flip flops.

Counter Classification

- Counters are broadly divided into two categories
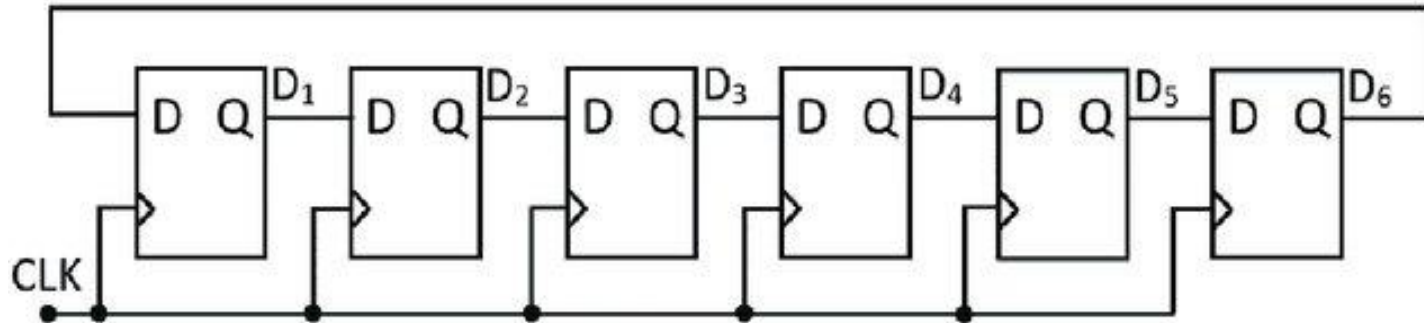
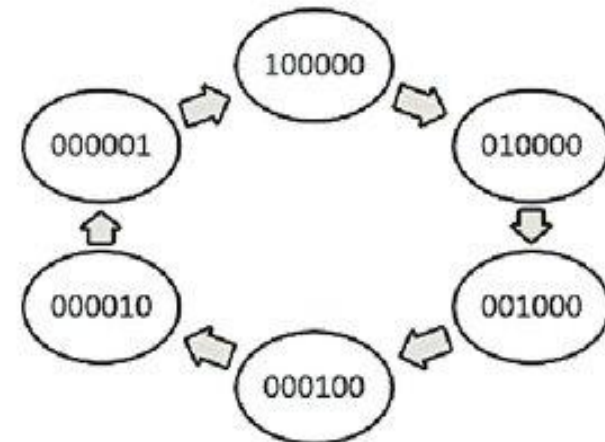- Asynchronous counter

- Synchronous counter

RING COUNTER

- **'N' bit Ring counter** performs the similar operation of SIPO shift register.

- But, the only difference is that the output of rightmost D flip-flop is given as input of leftmost D flip-flop instead of applying data from outside.

- Therefore, Ring counter produces a sequence of states pattern of zeros and ones pattern of zeros and ones and it repeats for every **'N' clock cycles**.

RING COUNTER

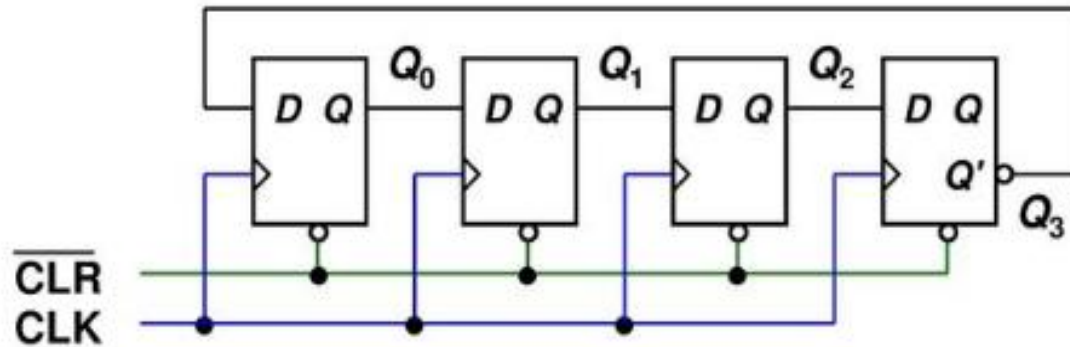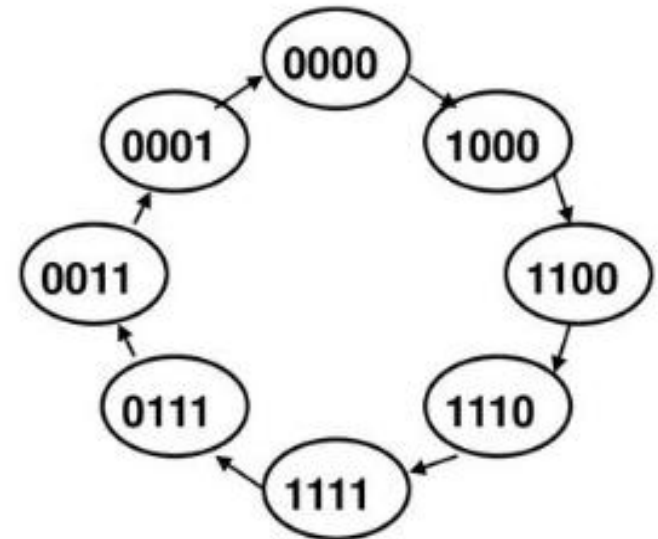| CLK	D_1	D_2	D_3	D_4	D_5	D_6
1	1	0	0	0	0	0
2	0	1	0	0	0	0
3	0	0	1	0	0	0
4	0	0	0	1	0	0
5	0	0	0	0	1	0
6	0	0	0	0	0	1

JOHNSON COUNTER

- The operation of **Johnson Ring counter** is similar to that of Ring counter.

- But, the only difference is that the complemented output of rightmost D flip-flop is given as input of leftmost D flip-flop instead of normal output.

- Therefore, 'N' bit Johnson Ring counter produces a sequence of states pattern of zeros and ones pattern of zeros and ones and it repeats for every **'2N' clock cycles**.

- Johnson Ring counter is also called as **Twisted Ring counter** and **switch tail Ring counter.**

JOHNSON COUNTER

Clock	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

THANK YOU