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 ELECTRONICS & COMMUNICATION ENGINEERING

19ECB231 – DIGITAL ELECTRONICS

II YEAR/ III SEMESTER

UNIT 4 –DESIGN OF SEQUENTIAL CIRCUITS

TOPIC – RING COUNTER

RING COUNTER

A ring counter is a Shift Register (a cascade connection of flip-flops) with the output of the last flip flop connected to the input of the first. It is initialized such that only one of the flip flop output is 1 while the remainder is 0.

WHAT IS THE PURPOSE OF RING COUNTER?

It is also known as switch-tail ring counter, walking ring counter or Johnson counter. It connects the complement of the output of the last shift register to the input of the first register and circulates a stream of ones followed by zeros around the ring. Here, we use Clock (CLK) for all the flip-flops.

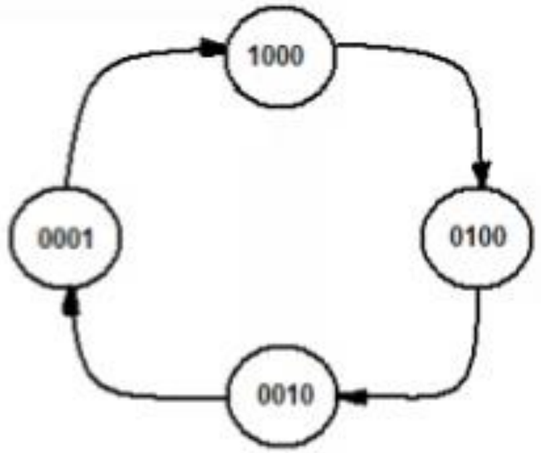
Ring Counters

- One flip-flop (stage) for each state in the sequence.
- The output of the last stage is connected to the D input of the first stage.
- An *n*-bit ring counter cycles through *n* states.
- No decoding gates are required, as there is an output that corresponds to every state the counter is in.

RING COUNTER

Ring Counter (continue)

- Ring counters are used to construct “One-Hot” counters
- It can be constructed for any desired MOD number
- A MOD-N ring counter uses N flip-flops connected in the arrangement as shown in fig. a)
- In general ring-counter will require more flip-flops than a binary counter for the same MOD number



d) State Diagram

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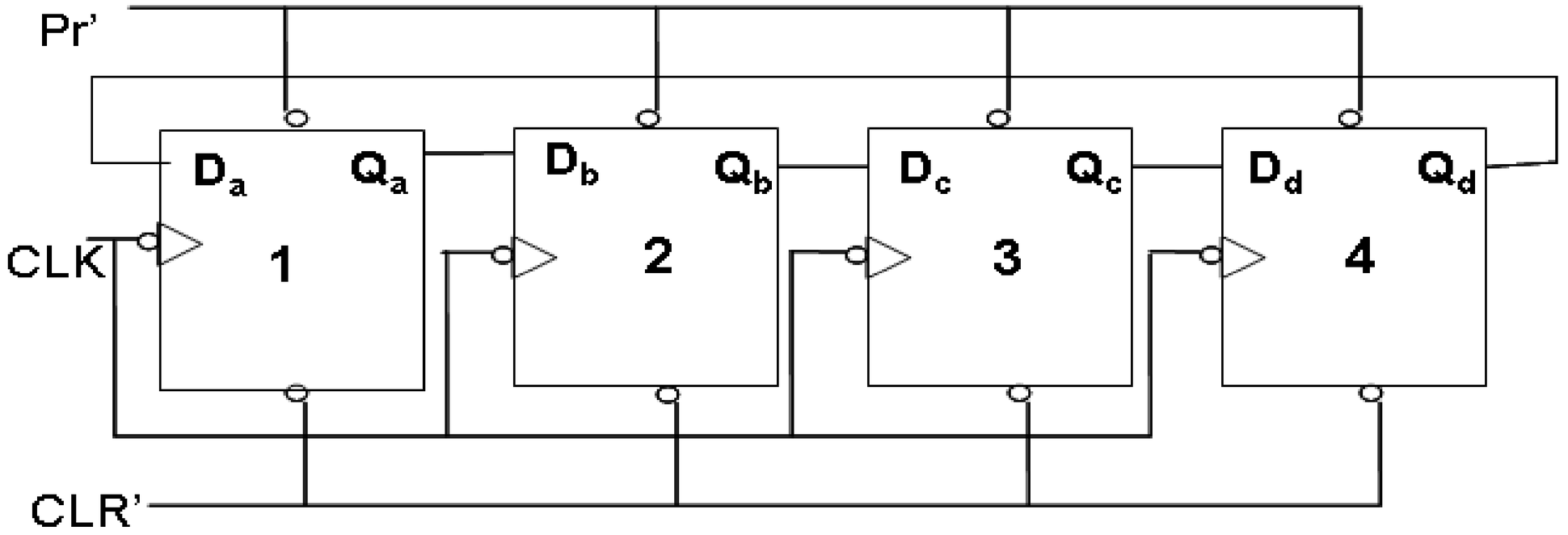
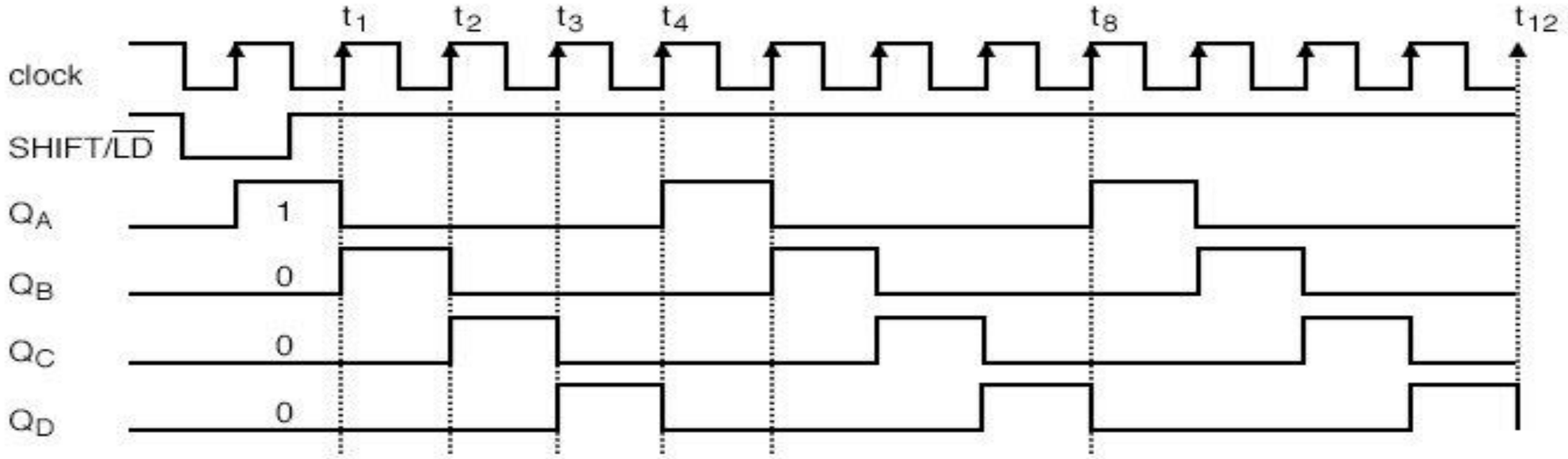
4 BIT RING COUNTER



TRUTH TABLE

States	Q_A	Q_B	Q_C	Q_D
1	0	0	0	0
2	1	0	0	0
3	1	1	0	0
4	1	1	1	0
5	1	1	1	1
6	0	1	1	1
7	0	0	1	1
8	0	0	0	1

TIMING DIAGRAM



Load 1000 into 4-stage ring counter and shift

Applications of Ring Counter

- Animation and simulation video.
- Data counting loop.
- (BCD) counter and divider circuit.
- Quadrature generator.
- Use in Digital Clocks

APPLICATIONS

Ring Counter Application

- Some devices require scanning. Scanning is when devices are enabled one at a time to:
  - check their status, or
  - enable their output

- An example of scanning is for keyboard inputs. The ring counter enables each of the keys in turn to check on their state.

ASSESSMENT

1.What is Register?
2.List the types of Shift registers.
3.Explain the operation of SISO,SIPO shift register.

THANK YOU