Digital Logic Design

Lecture 20

Bidirectional Shift Register

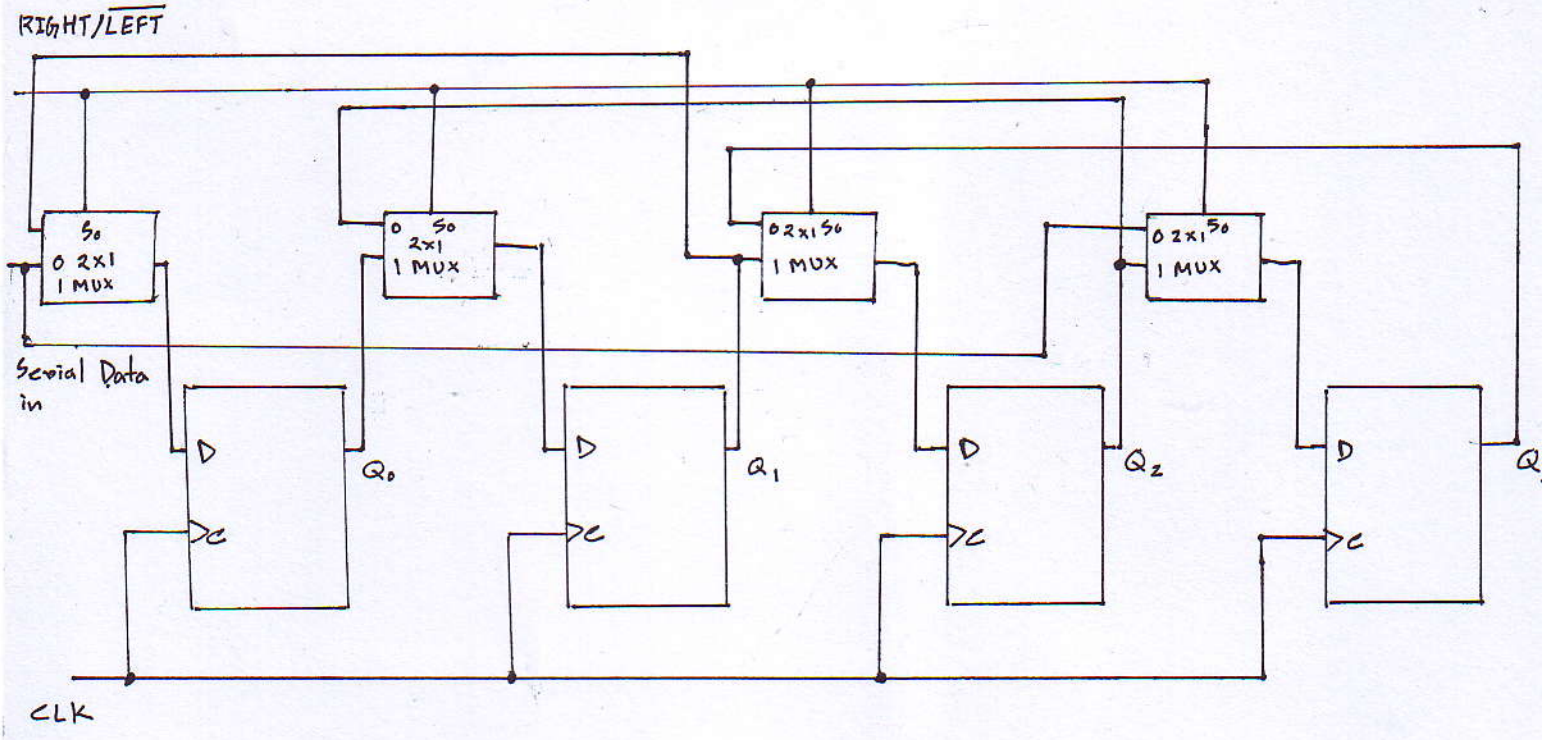
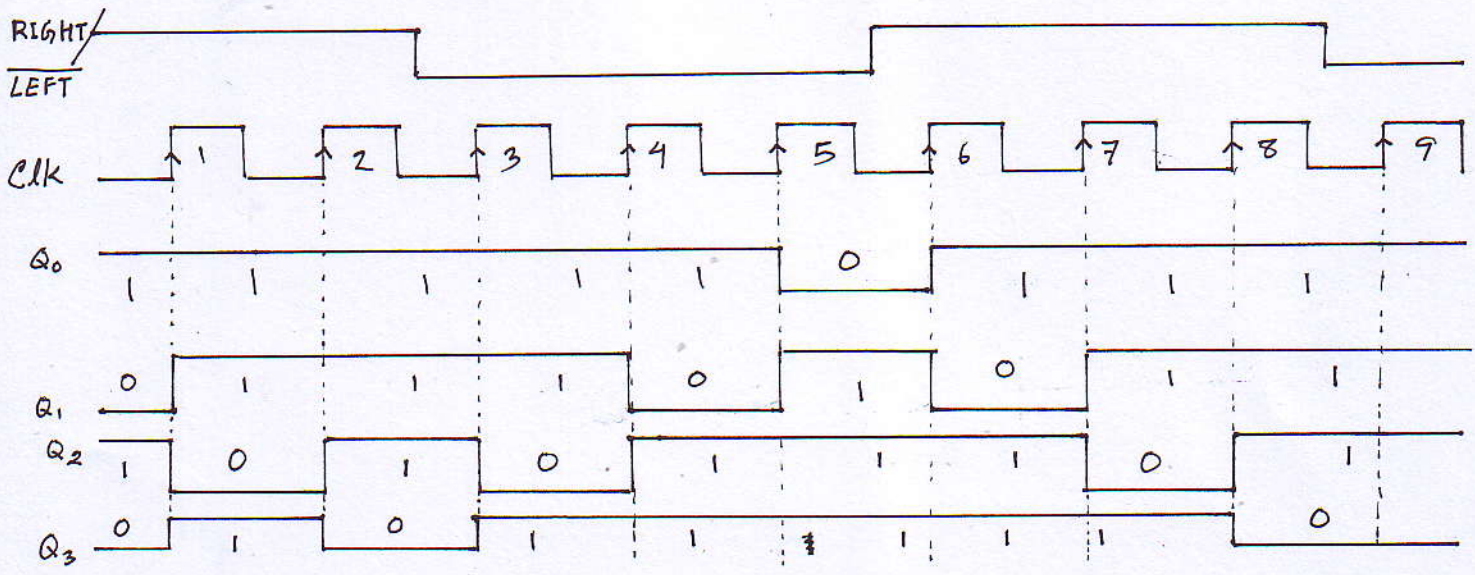


Fig : Four - bit bidirectional shift register

* Determine the state of bidirectional shift register if initially $Q_0 = 1$, $Q_1 = 0$, $Q_2 = 1$, $Q_3 = 0$ and serial data input is HIGH.



Shift Register Counters :

The Johnson Counter

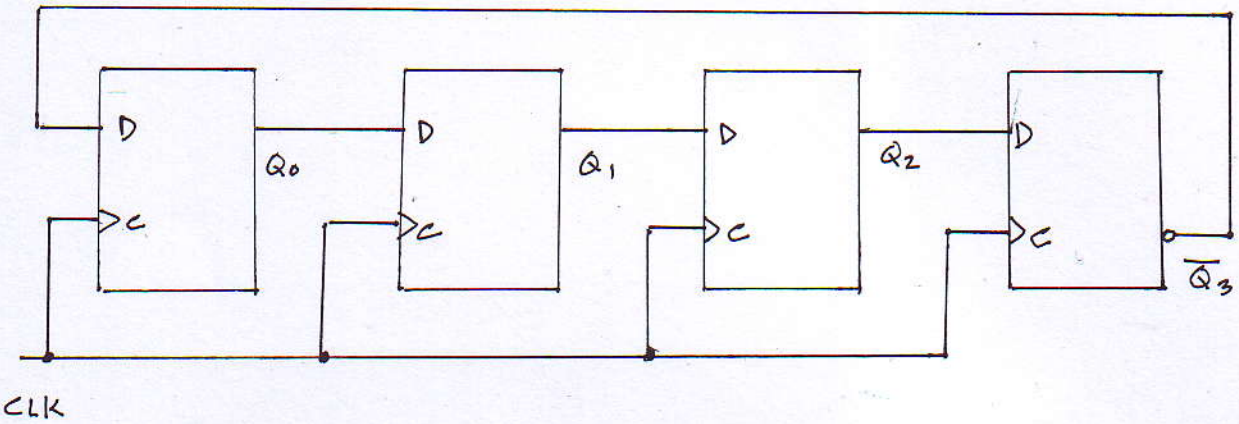
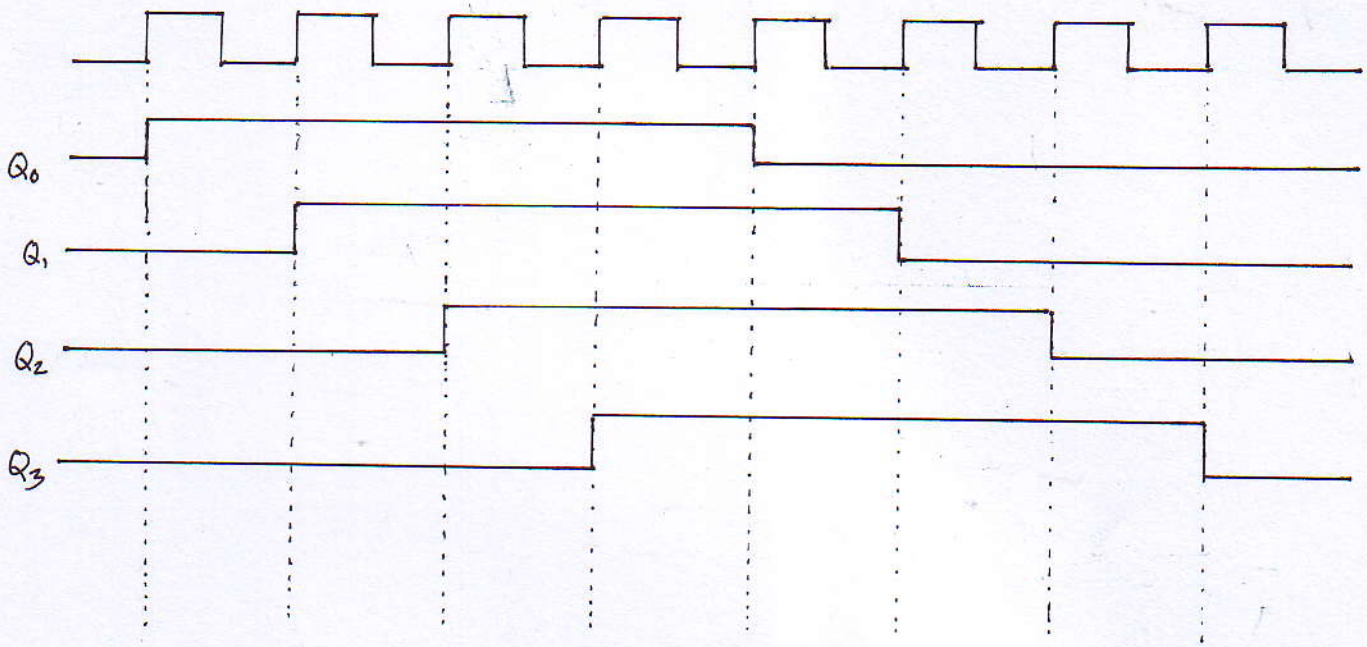


Fig : Four-bit Johnson Counter

Four-bit Johnson Sequence

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
8 (recycles)	0	0	0	0

Timing sequence for 4-bit Johnson Counter



The Ring Counter :

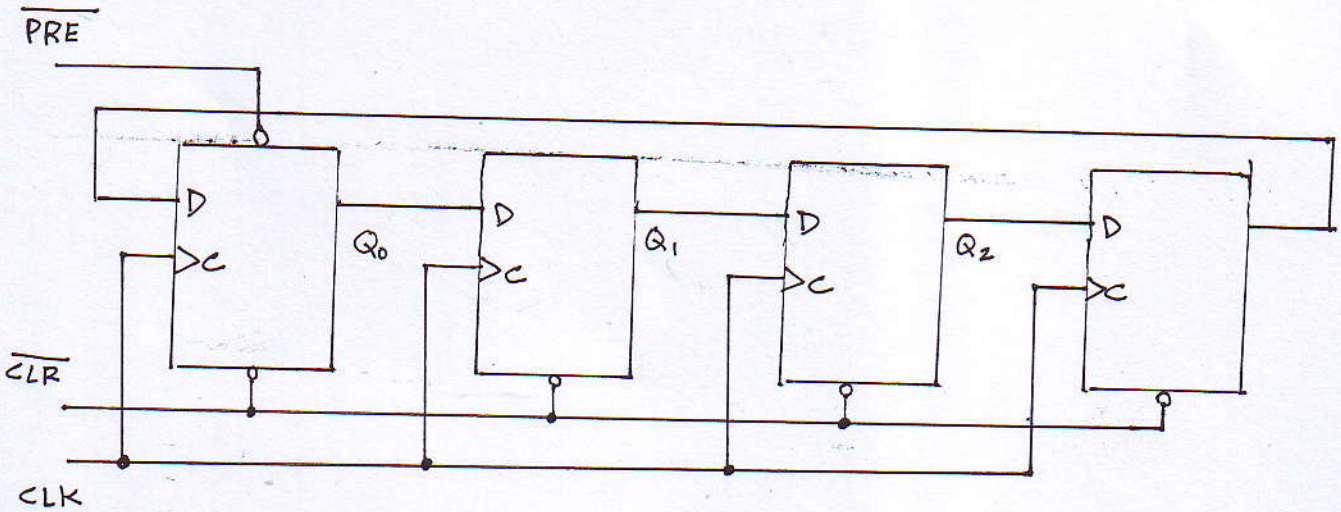


Fig : A 4-bit Ring Counter

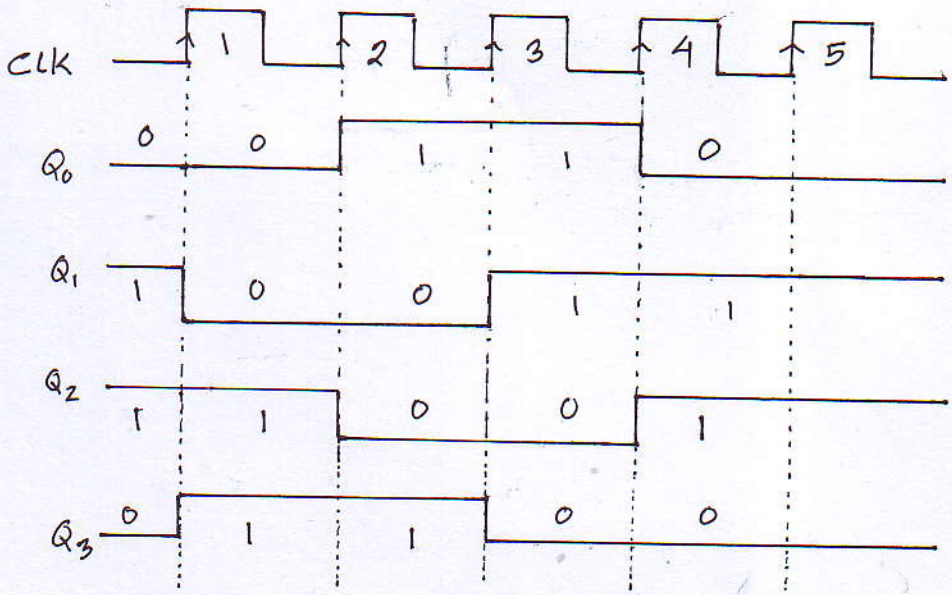
4-bit Ring Counter Sequence

Clock Pulse	Q_0	Q_1	Q_2	Q_3
0	1	0	0	0
1	0	1	0	0
2	0	0	1	0
3	0	0	0	1
4 (recycles)	1	0	0	0

If a 4-bit Ring counter has an initial state 0110, then determine its timing sequence.

Clock pulse	Q_0	Q_1	Q_2	Q_3
0	0	1	1	0
1	0	0	1	1
2	1	0	0	1
3	1	1	0	0
4 (recycles)	0	1	1	0

Timing sequence :



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