Register

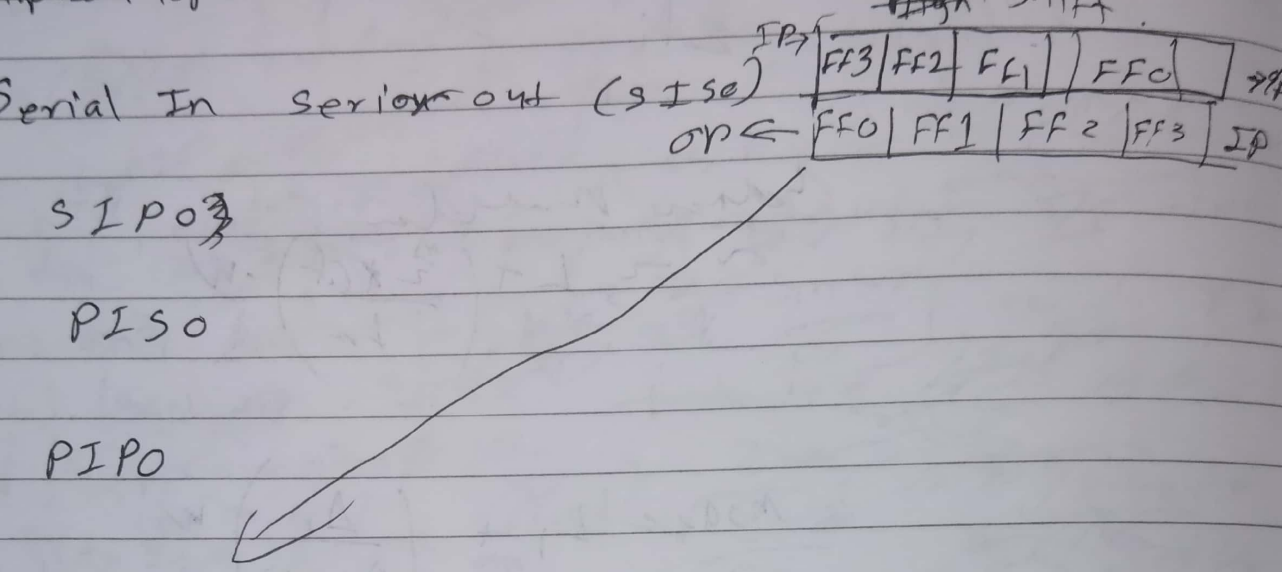
To increase the storage capacity in terms of no. of bits we have to use a group of flip-flops. such a group of flip-flops are known registers. Left shift

1) Serial In Serial out (SISO)

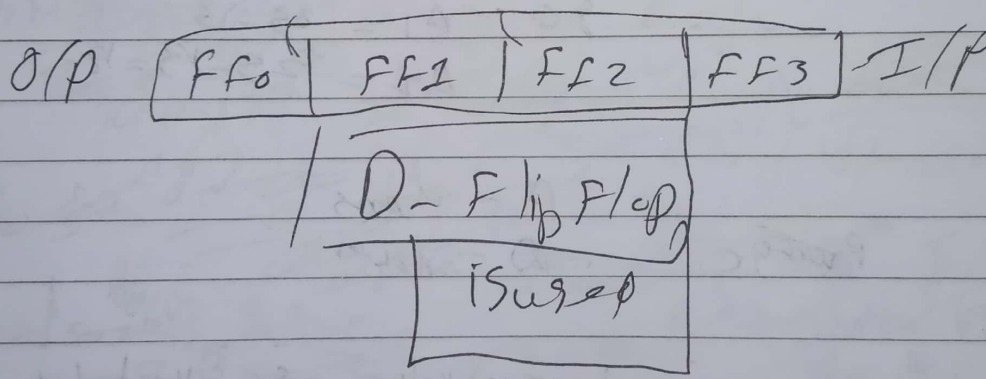
2) SIPO

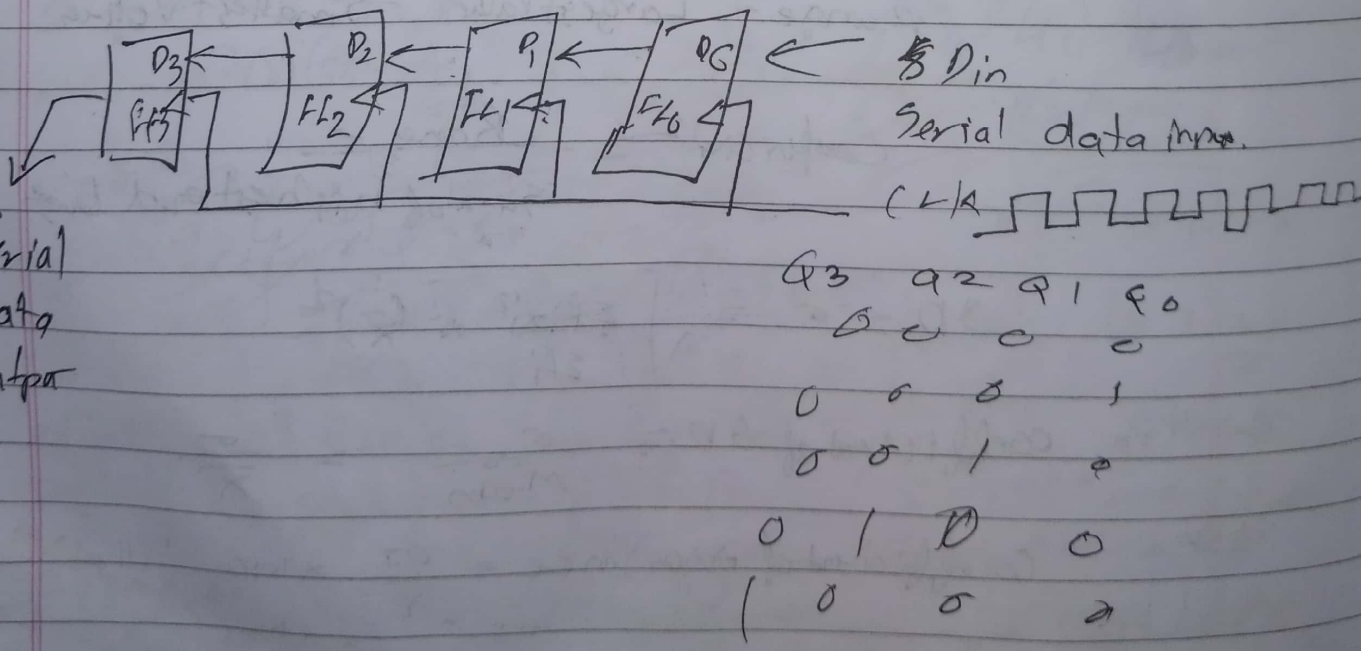
3) PISO

4) PIPO

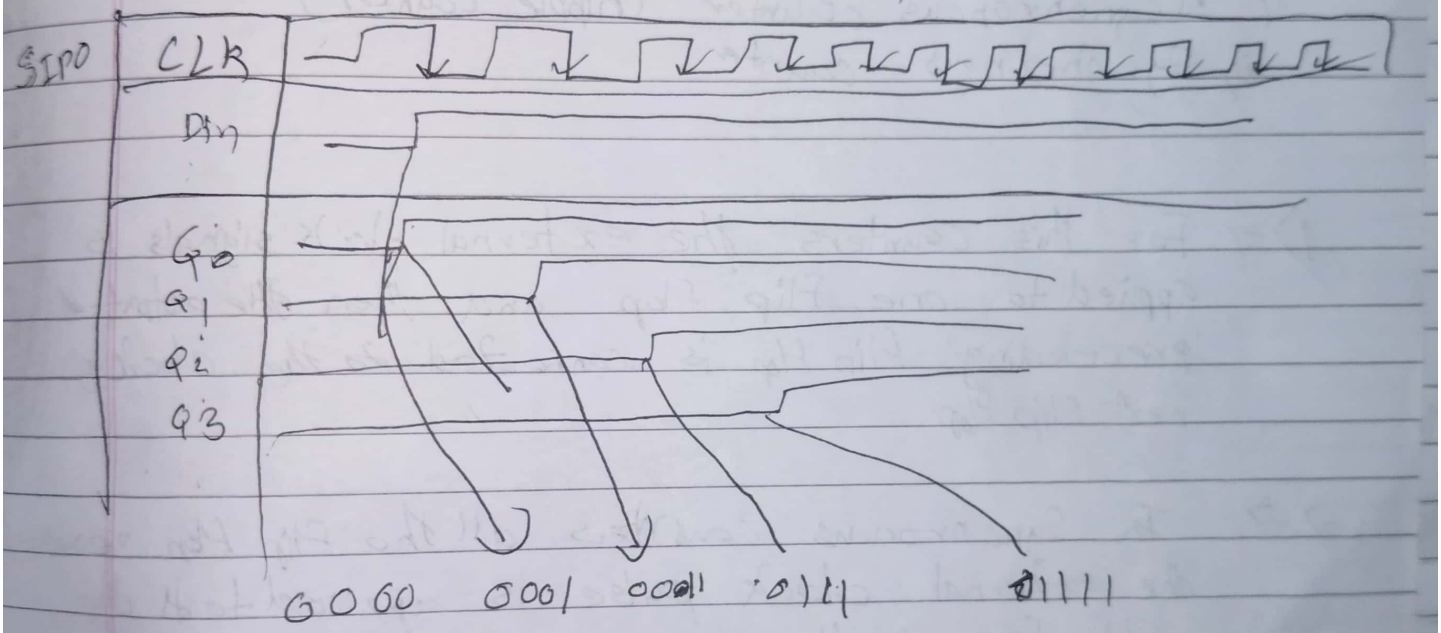


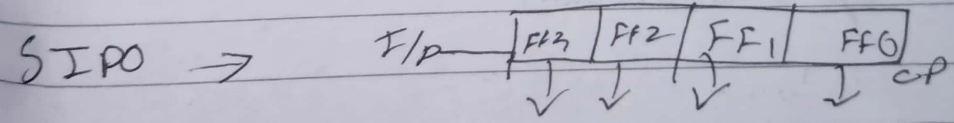
Left Shift

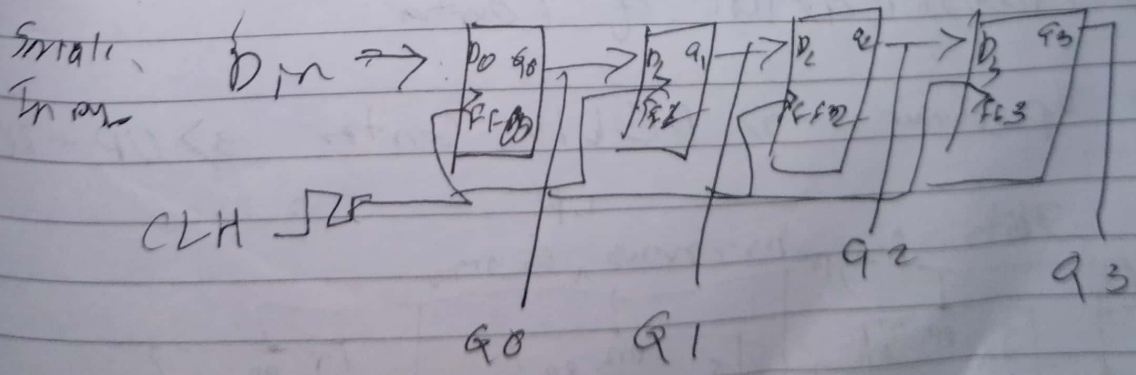




CLK	Q3	Q2	Q1	Q0	D0
Initially	0	0	0	0	
	0	0	0	0	1
↓	0	0	0	0	1
↓	0	0	0	1	1
↓	0	0	1	1	1
↓	0	1	1	1	1
↓	1	1	1	1	







① In this operation the data is entered serially and taken out parallel as shown in figure.

② 1st the data is loaded bit by bit. Those outputs

Page No.
Date

Goes right to Left

③ As soon as the loading is complete and all the flip flops contain the required data the outputs are enabled so that all the data is made available simultaneously

Counters.

A digital circuit used for counting pulses is known as counters and its a sequential ~~output~~ circuit.

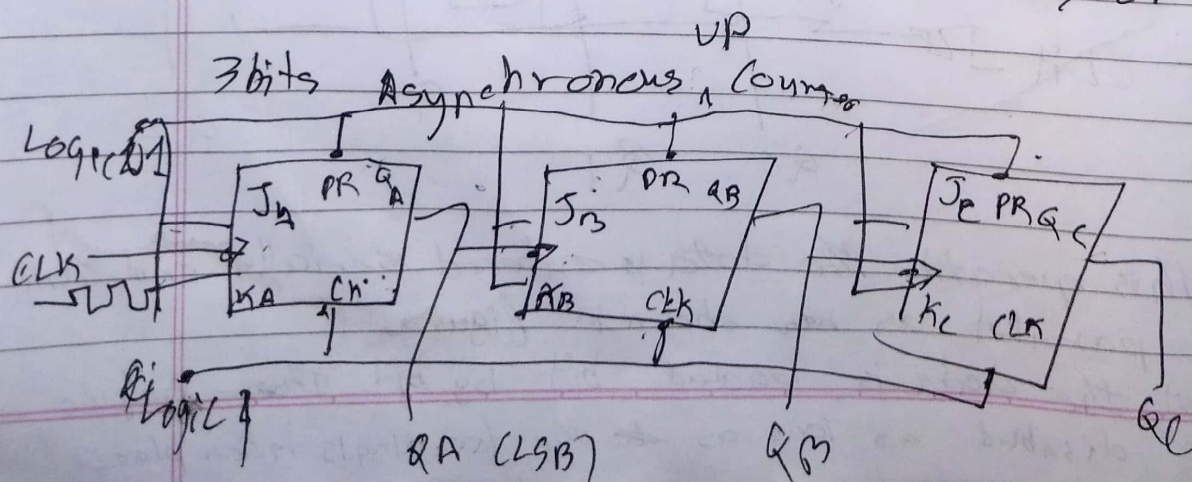
1) Asynchronous counter (Ripple counter)
2) Synchronous counter.

1) → For this counters the external clock signals is applied to one Flip flop and then the output of preceeding Flip Flop is connected to the clock of next Flip Flop.

2) → In Synchronous counters all the flip flop receive the external clock pulse is applied to all the Flip Flop simultaneously.

✱ Classification of counter

1) Up counter 2) DOWN Conter 3) UP - DOWN Conter



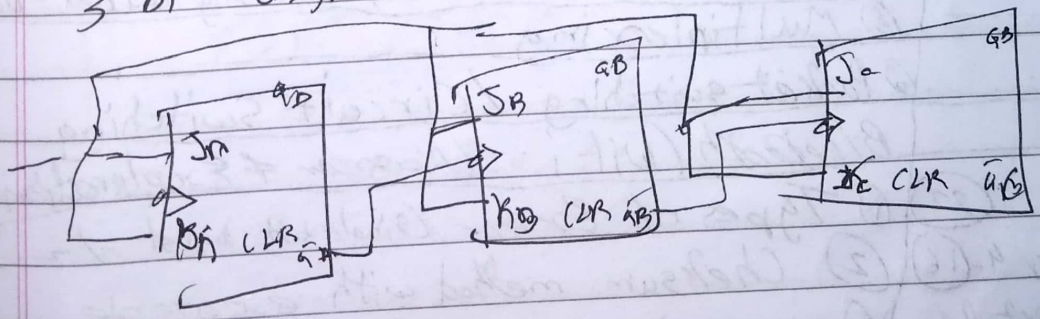
Page No.
Date

Q_C Q_B Q_A

0 0 0
0 0 1
0 1 0
0 1 1

CLK	Q_C	Q_B	Q_A	State	D. E
	0	0	0	1	0
↓	0	0	1	2	1
↓	0	1	0	3	2
↓	0	1	1	4	3
↓	1	0	0	5	4
↓	1	0	1	6	5
↓	1	1	0	7	6
↓	1	1	1	8	7
↓	0	0	0		

3 bit asynchronous down counter.



Up down - counter