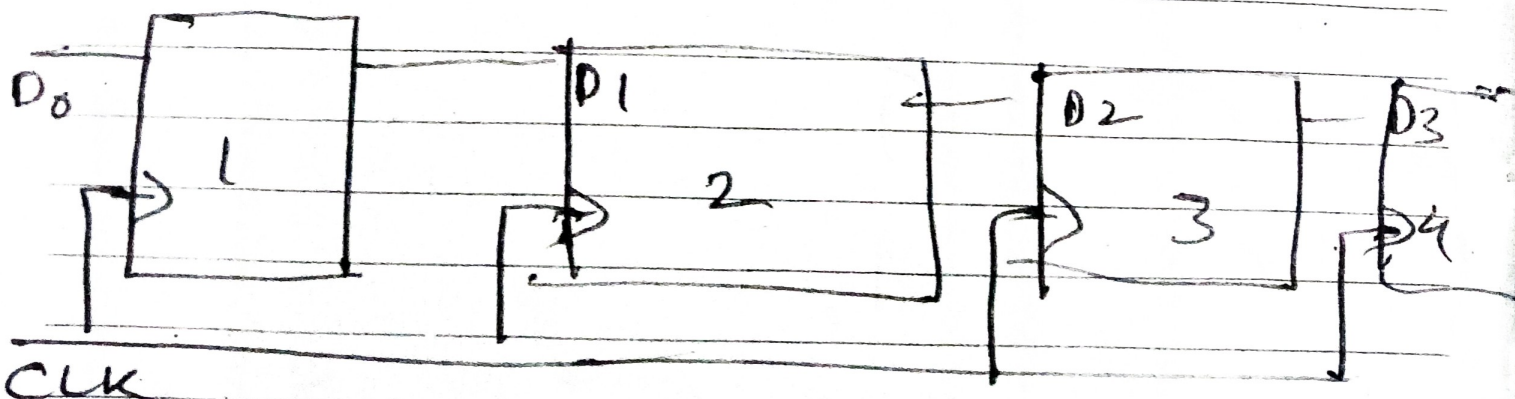
SUNDAY

Shift Register

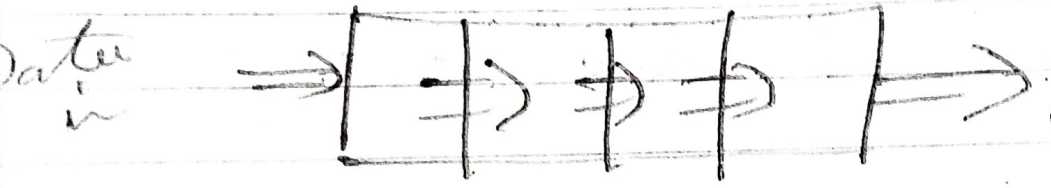
- A set of n - flip flop
- Each flip-flop stores one bit.
- Two basic functions → Data Storage
  → Data transfer

Shift register is a type of sequential logic circuit, mainly for storage of digital data.

They are a group of FFs connected in a chain so that O/P from one FFs ~~connected to~~ a become the I/P of next FF

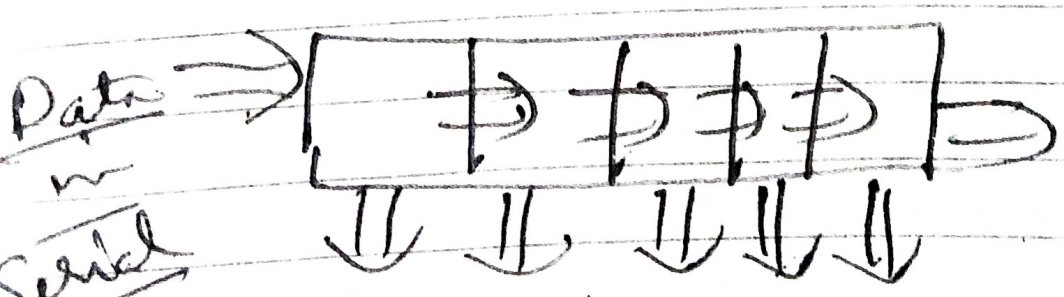


It is a register that allows each of the flip-flops to pass the stored information to its adjacent neighbour.

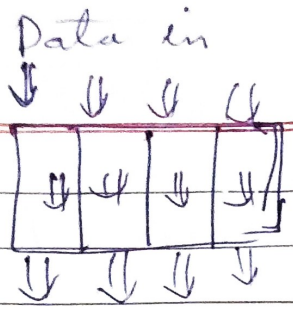


Serial in / Shift right / Serial out

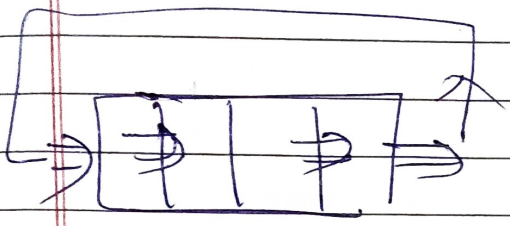
Serial in / Shift left / Serial out



Data Out Parallel out

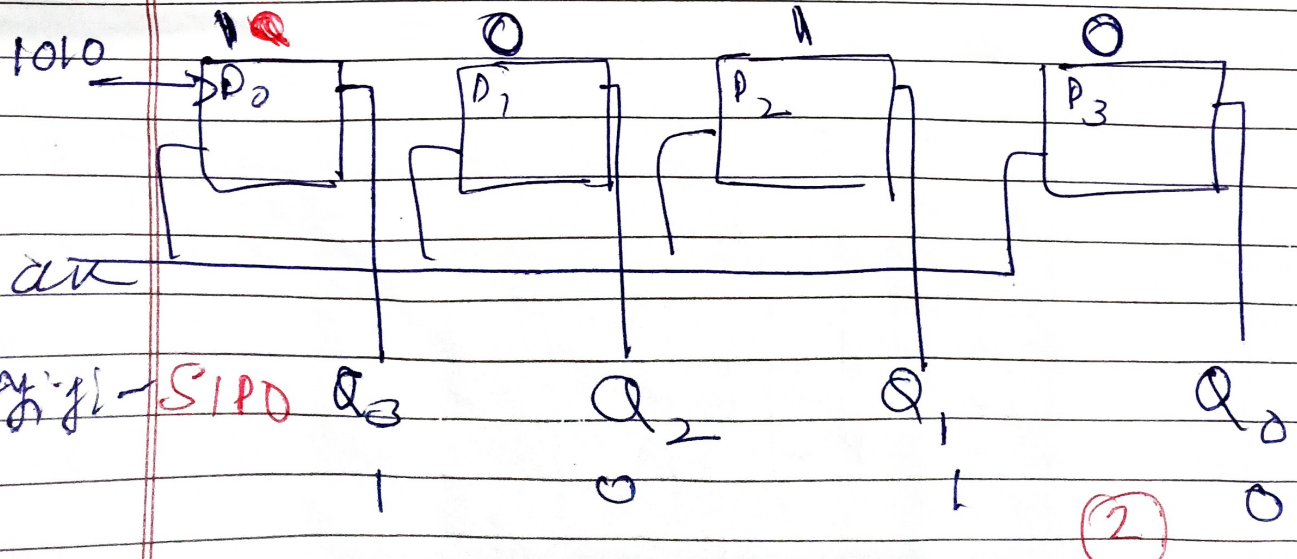


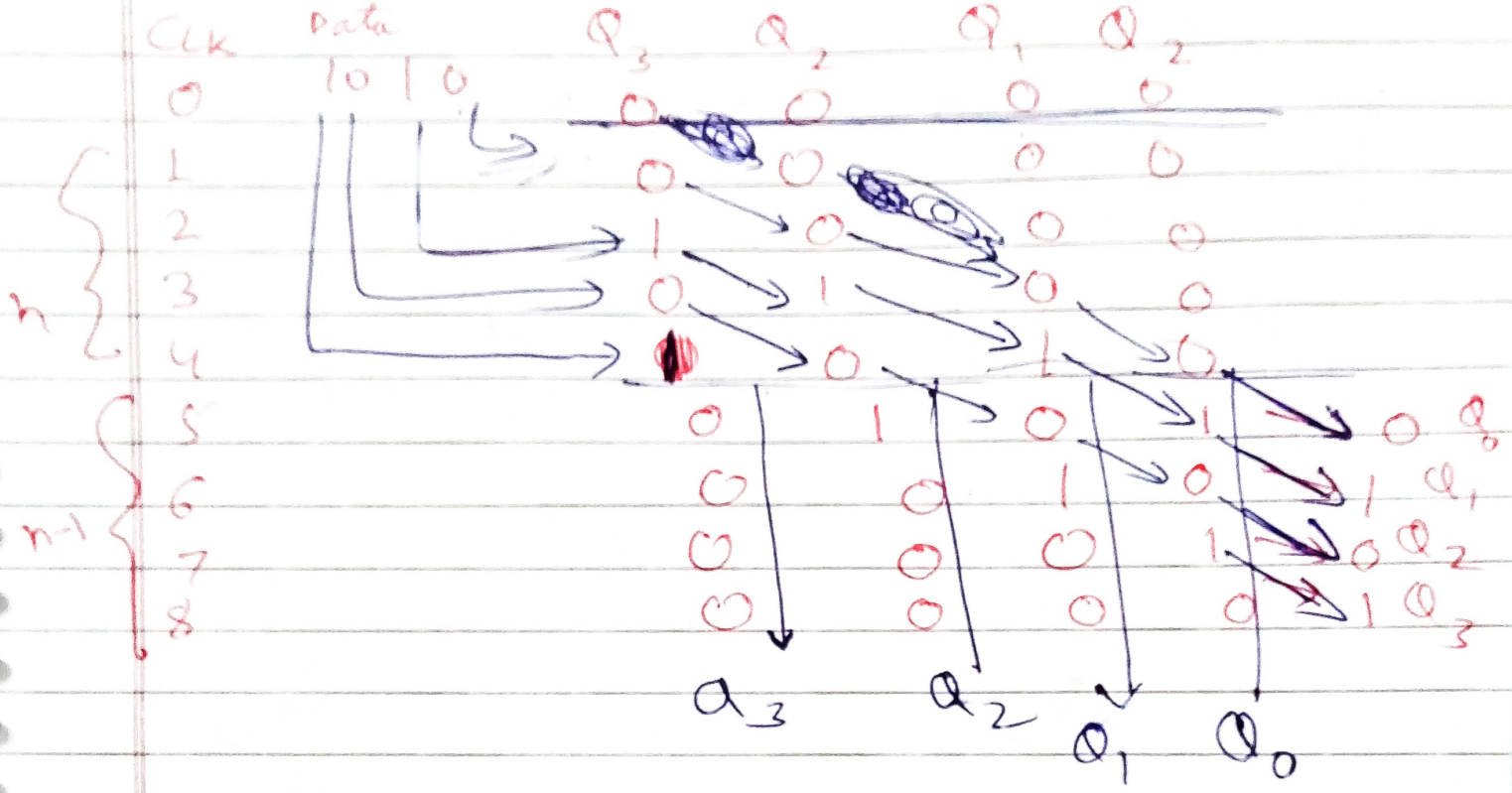
(Parallel in Parallel Out)



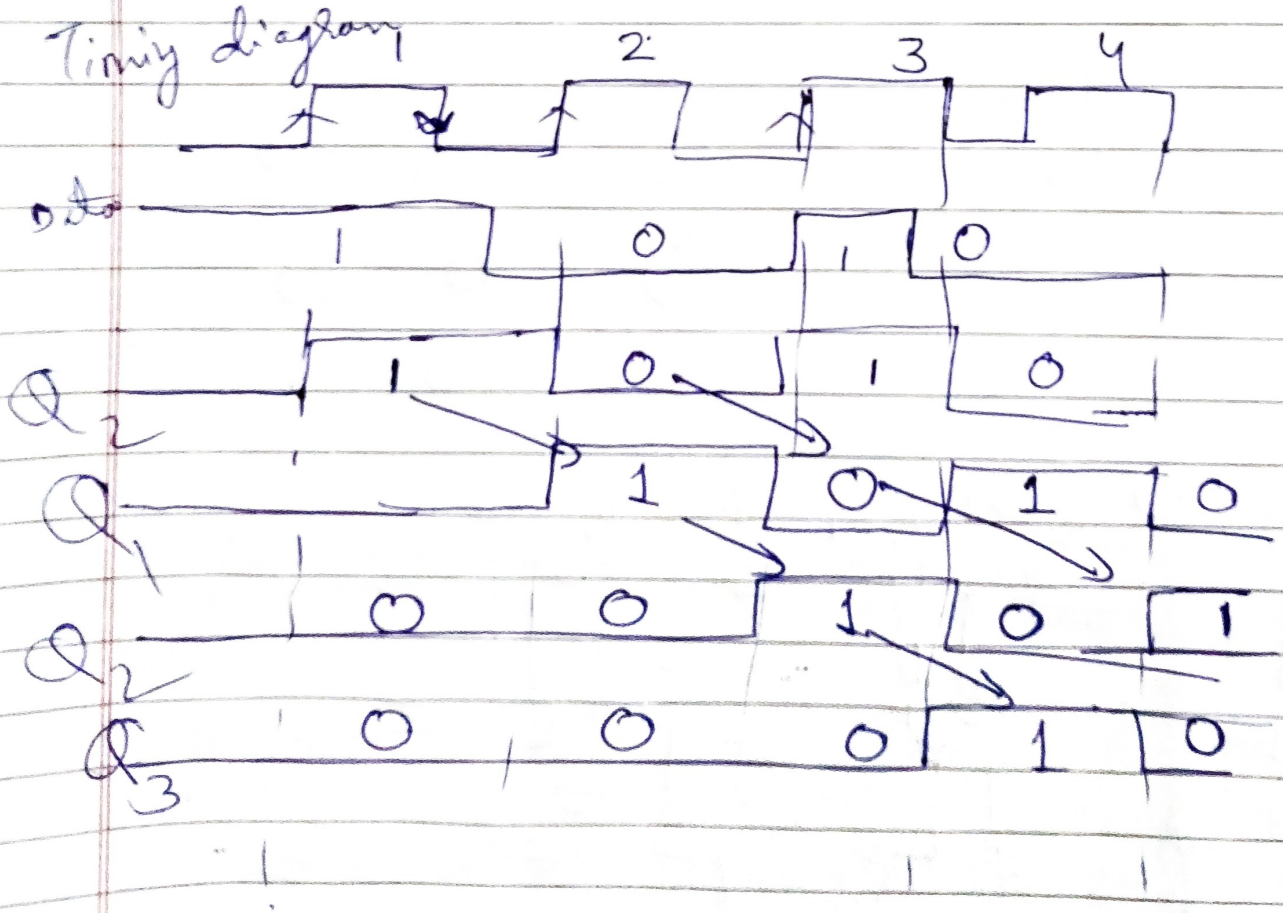
Types of Shift Register

i) SISO
ii) SIPO
iii) PISO
iv) PIPO
v) Bidirectional Shift Register
vi) Universal Shift Register

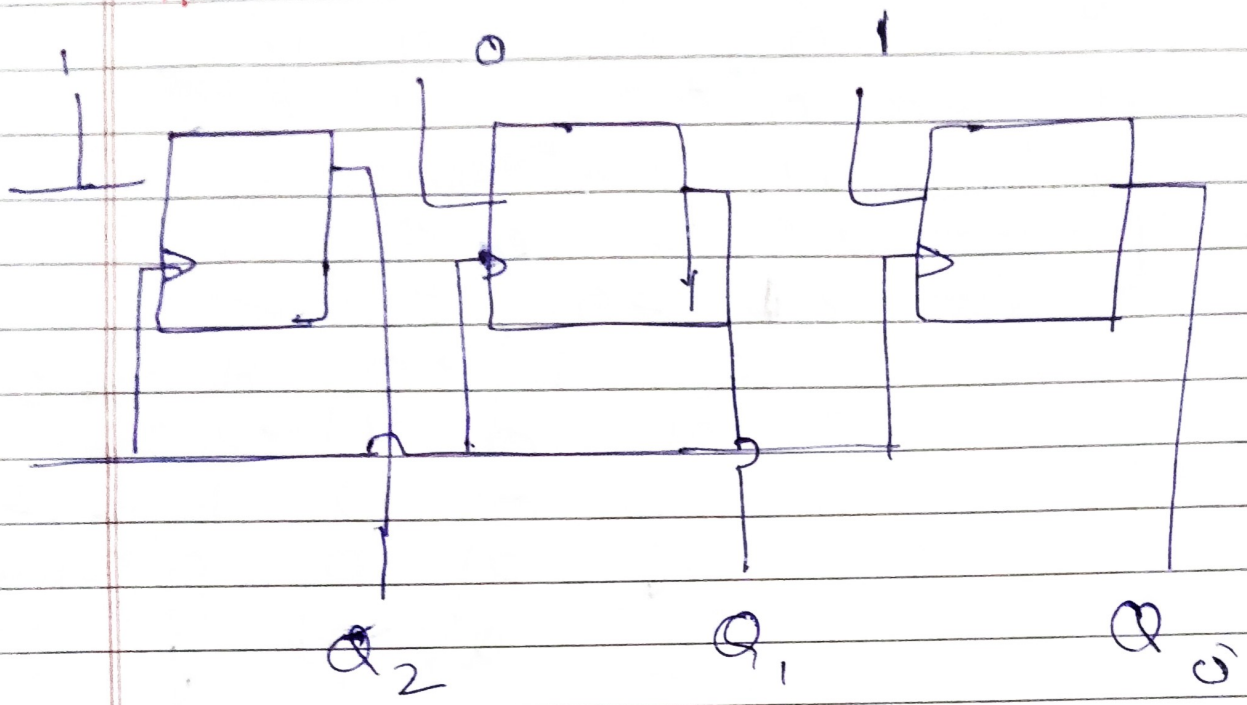




Timing diagram

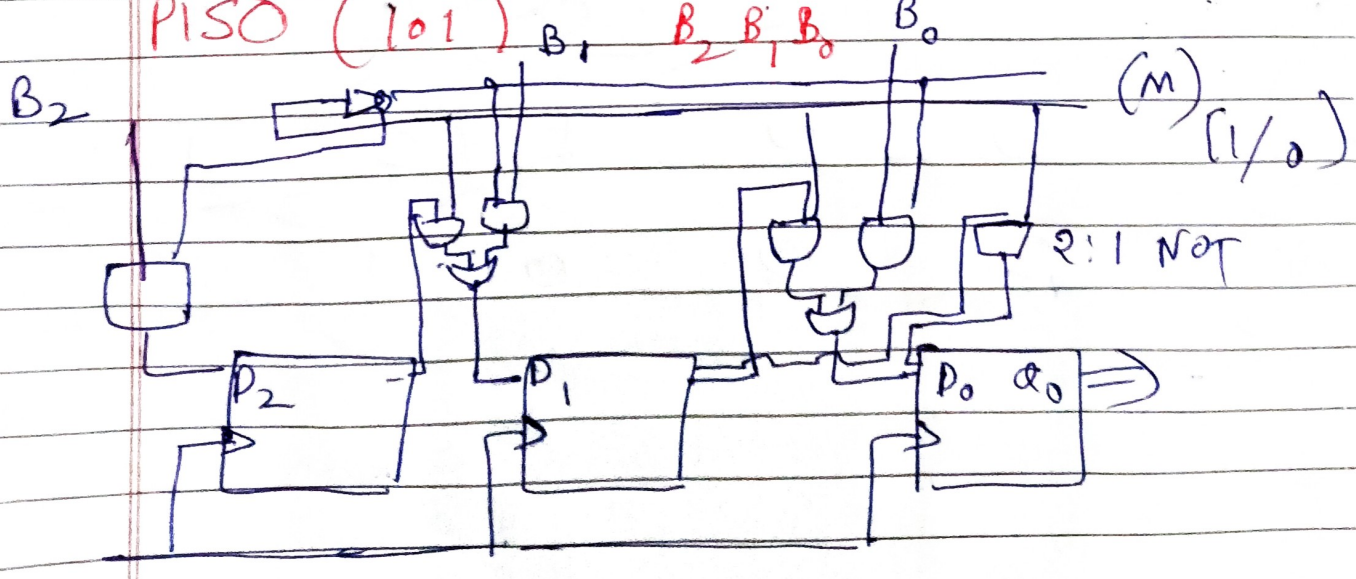


PIPO (101)

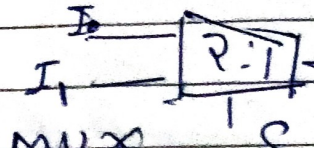


CLK	~~Data~~	Q_2	Q_1	Q_0
	101			
0		0	0	0
1		1	0	1

PISO (101)



2:1 MUX



$y = \bar{S} I_0 + S I_1$

AND OR

(4)

	No. of Clock Pulse	
	Data in	Data Out
SISO	n	n−1
SIPO	n	0
PISO	1	n−1
PIPO	1	0

Imp. Questions (for Practice)

Q. Design Syn Counter with Counting Seq 0, 2, 1, 3, 4, 0

Soln:-

→ Identify no. of states ⇒ n = 3
& no. of FFs = 3

→ Construct State Table

→ Write excitation eqn

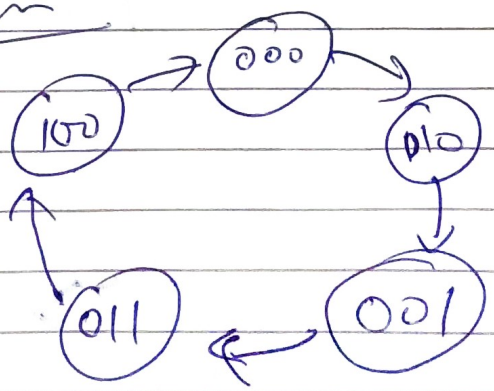
→ Minimize logical expression

→ Implement

0 → 2 → 1 → 3 → 4 → 0

000 010 001 011 100

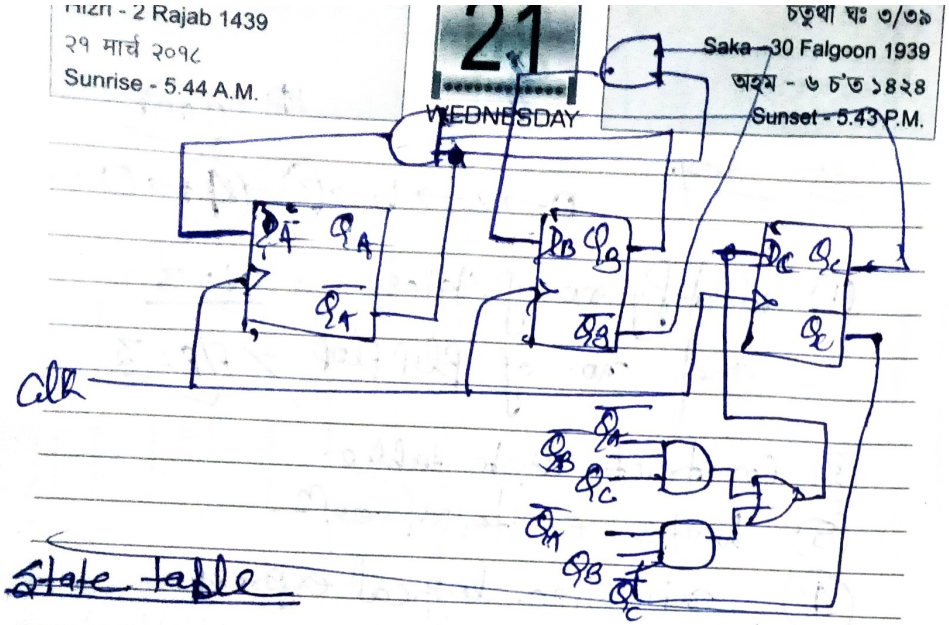
State diagram



Hizri - 2 Rajab 1439
২১ মার্চ ২০১৮
Sunrise - 5.44 A.M.

21
WEDNESDAY

চতুর্থী ঘঃ ৩/৩৯
Saka - 30 Falgoon 1939
অহম - ৬ চ'ত ১৪২৪
Sunset - 5.43 P.M.



State table

Present state			Next State			Excitation table		
Q_A	Q_B	Q_C	Q_{A+1}	Q_{B+1}	Q_{C+1}	D_A	D_B	D_C
0	0	0	0	1	0	0	1	0
0	1	0	0	0	1	0	0	1
0	0	1	0	1	1	0	1	1
0	1	1	1	0	0	1	0	0
1	0	0	0	0	0	0	0	0

MAR T F S S M T W T F S

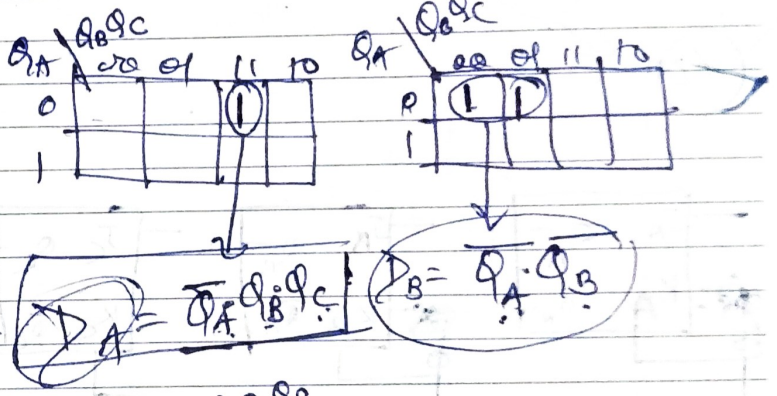
পঞ্চমী ঘঃ ১/৫৬
Saka - 1 Chaitra 1940
অহম - ৭ চ'ত ১৪২৪
Sunrise - 5.43 A.M.

22
THURSDAY

Hizri - 3 Rajab 1439
২২ মার্চ ২০১৮
Sunset - 5.43 P.M.

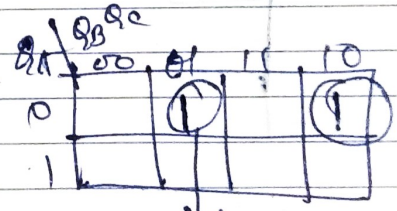
Q_A	Q_{A+1}	S	R	J	K	D	T
0	0	0	X	0	X	0	0
0	1	1	0	1	X	1	1
1	0	0	1	X	1	0	1
1	1	X	0	X	0	1	0

for D_A



for D_B

D_C



$D_C = \bar{Q}_A Q_B Q_C + Q_A \bar{Q}_B \bar{Q}_C$

Q → Draw for 0, 3, 2, 4, 0

MARCH 24 SATURDAY Basanti Puja

Q_A	Q_B	Q_C

Q_n	Q_{n+1}	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

Present state			Next state			Excitation Table					
Q_A	Q_B	Q_C	Q_{An}	Q_{Bn}	Q_{C+1}	J_A	K_A	J_B	K_B	J_C	K_C
0	0	0	0	1	1	0	X	1	X	1	X
0	1	1	0	1	0	0	X	X	0	X	1
0	1	0	1	0	0	1	X	X	1	0	X
1	0	0	0	0	0	X	1	0	X	0	X

J_A

Q_A \ Q_BQ_C	00	01	11	10
0				1
1	X			

$J_A = \overline{Q}_A Q_B \overline{Q}_C$

K_A

Q_A \ Q_BQ_C	00	01	11	10
0	X	X		X
1				

$K_A = Q_B \overline{Q}_C$

J_B

Q_A \ Q_BQ_C	00	01	11	10
0	1		X	X
1				

$J_B = \overline{Q}_A \overline{Q}_C$

K_B

Q_A \ Q_BQ_C	00	01	11	10
0	X			1
1	X			

$K_B = \overline{Q}_A \overline{Q}_C$

J_C

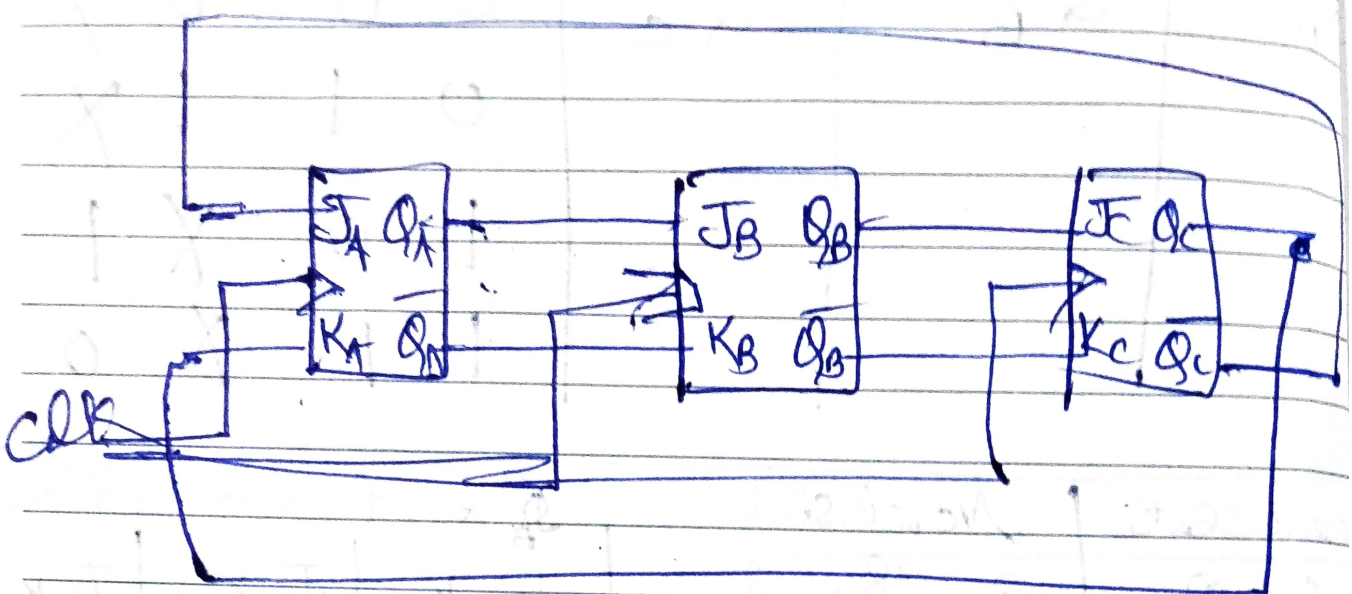
Q_A \ Q_BQ_C	00	01	11	10
0	1		X	
1				

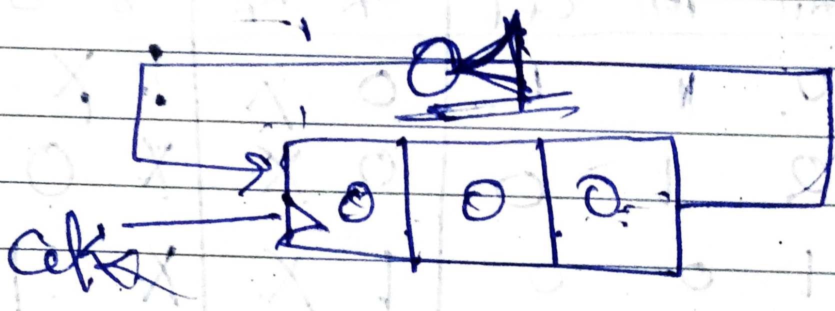
$J_C = \overline{Q}_A Q_B$

K_C

Q_A \ Q_BQ_C	00	01	11	10
0			X	1
1			X	1

$K_C = Q_A Q_B \overline{Q}_C$





clk	Q_A	Q_B	Q_C	
0	0	0	0	0
1	1	0	0	4
2	1	1	0	6
3	1	1	1	7
4	0	1	1	3
5	0	0	1	1
6	0	0	0	0

6

2

9