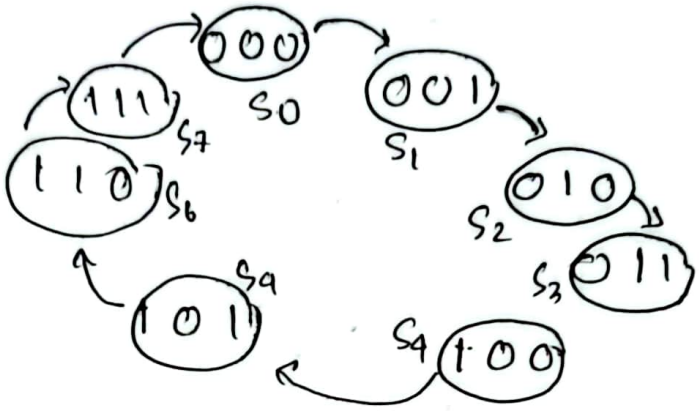
Choosen Characters

Rhythm 47

State Diagram:

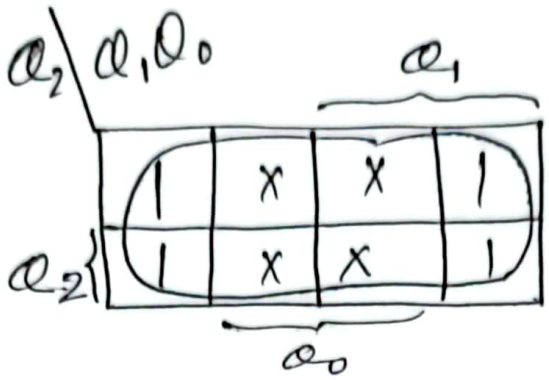


State Table: (JK-FlipFlop)

Present State			Next State			Excitation Table					
Q_2	Q_1	Q_0	Q_2'	Q_1'	Q_0'	J_2	K_2	J_1	K_1	J_0	K_0
0	0	0	0	0	1	0	X	0	X	1	X
0	0	1	0	1	0	0	X	1	X	X	1
0	1	0	0	1	1	0	X	X	0	1	X
0	1	1	1	0	0	1	X	X	1	X	1
1	0	0	1	0	1	X	0	0	X	1	X
1	0	1	1	1	0	X	0	1	X	X	1
1	1	0	1	1	1	X	0	X	0	1	X
1	1	1	0	0	0	X	1	X	1	X	1

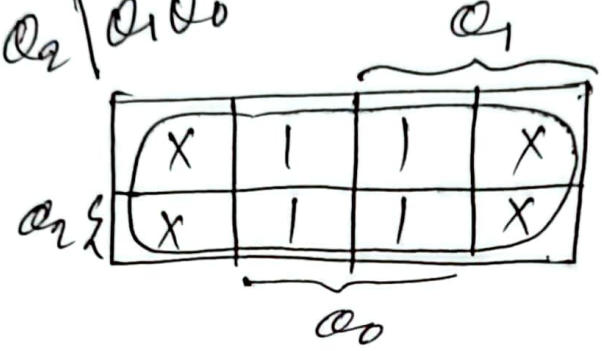
K-Map for JK- FlipFlops

$J_0 \rightarrow$



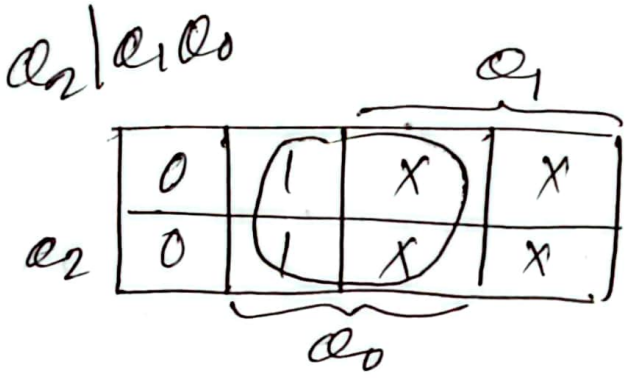
$J_0 = 1$

$K_0 \rightarrow$



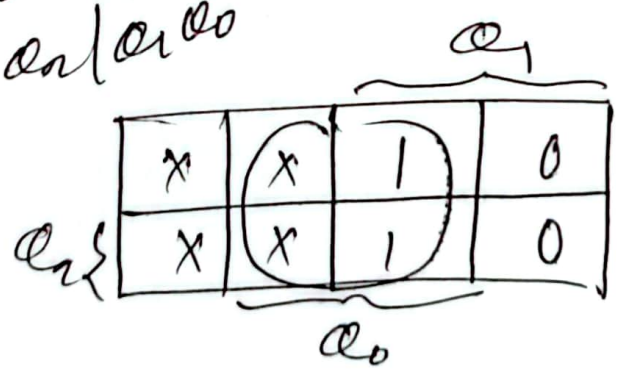
$K_0 = 1$

$J_1 \rightarrow$



$J_1 = Q_0$

$K_1 \rightarrow$

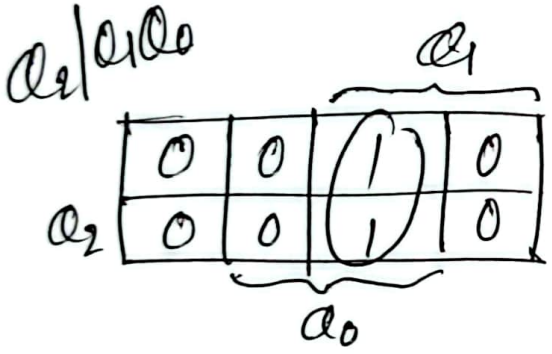


$K_1 = Q_0$

State Table (T-Flip Flop)

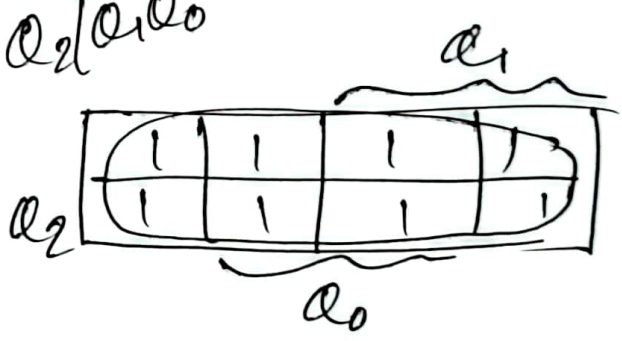
Present State			Next State			Excitation Table		
Q_2	Q_1	Q_0	Q_2'	Q_1'	Q_0'	T_2	T_1	T_0
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	1
0	1	0	0	1	1	0	0	1
0	1	1	1	0	0	1	1	1
1	0	0	1	0	1	0	0	1
1	0	1	1	1	0	0	1	1
1	1	0	1	1	1	0	0	1
1	1	1	0	0	0	1	1	1

$T_2 \rightarrow$



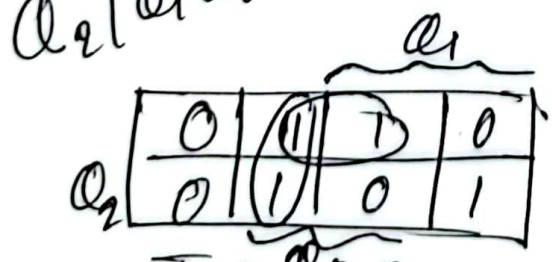
$T_2 = Q_1 Q_0$

$T_0 \rightarrow$



$T_0 = 1$

$T_1 \rightarrow$



$T_1 = \bar{Q}_1 Q_0 + Q_0$

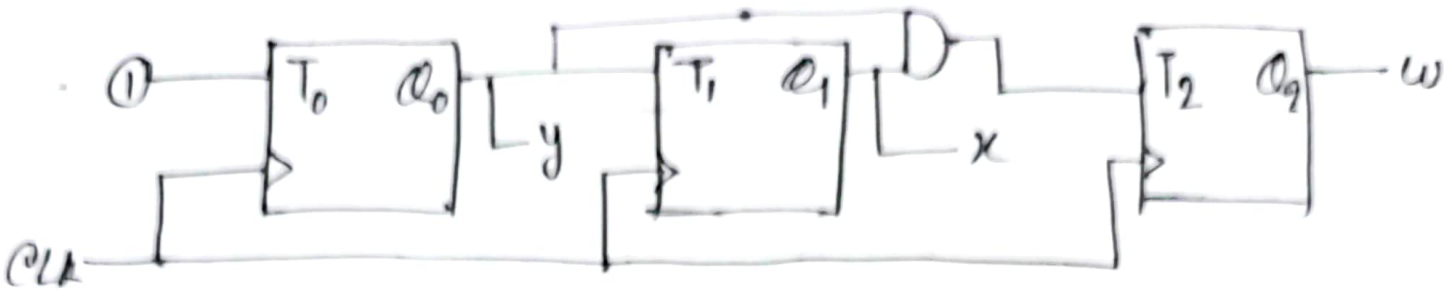
$= Q_0(1 + \bar{Q}_1) = Q_0$

$\therefore T_0 = 1$

$T_1 = Q_0$

$T_2 = Q_1 Q_0$

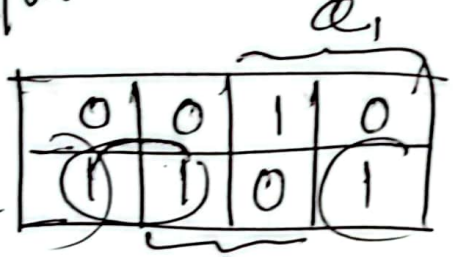
Circuit Diagram:



State Table : (D Flip-flop)

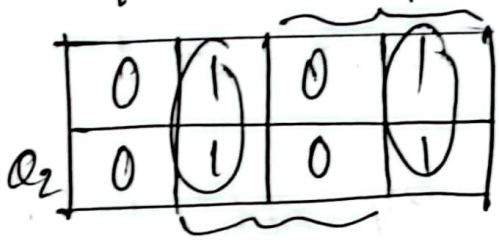
Present State			Next State			Excitation Table		
Q_2	Q_1	Q_0	Q_2'	Q_1'	Q_0'	D_2	D_1	D_0
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	0
0	1	0	0	1	1	0	1	1
0	1	1	1	0	0	1	0	0
1	0	0	1	0	1	1	0	1
1	0	1	1	1	0	1	1	0
1	1	0	1	1	1	1	1	1
1	1	1	0	0	0	0	0	0

$D_2 \longrightarrow$ $Q_2 | Q_1 Q_0$



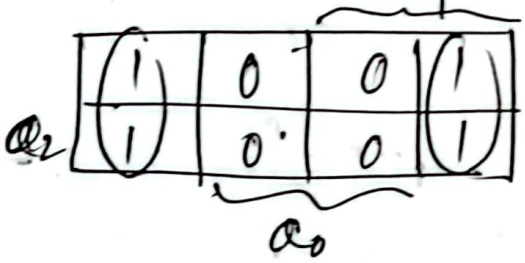
$D_2 = Q_2(\bar{Q}_0 + \bar{Q}_1)$

D_1 $Q_2 | Q_1 Q_0$



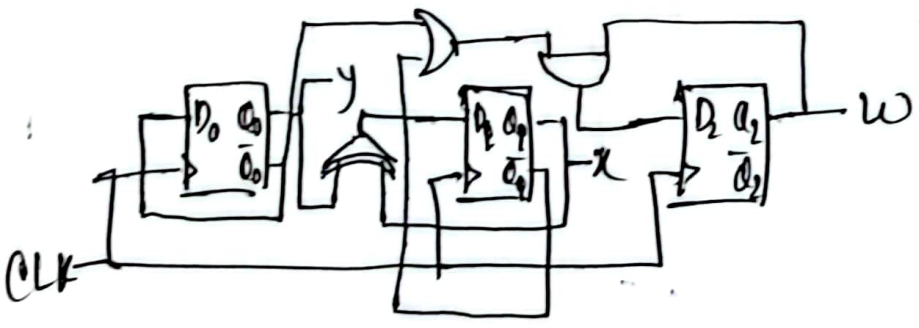
$D_1 = Q_1 \oplus Q_0$

$D_0 \longrightarrow$ $Q_2 | Q_1 Q_0$



$D_0 = \bar{Q}_0$

Circuit Diagram:



$J_2 \rightarrow Q_2 | Q_1 Q_0$

Q_2 \ Q_1Q_0	00	01	11	10
0	0	0	1	0
1	x	x	x	x

Q_1 (01, 11) ; Q_0 (11, 10)

$J_2 = Q_1 Q_0$

$K_2 \rightarrow Q_2 | Q_1 Q_0$

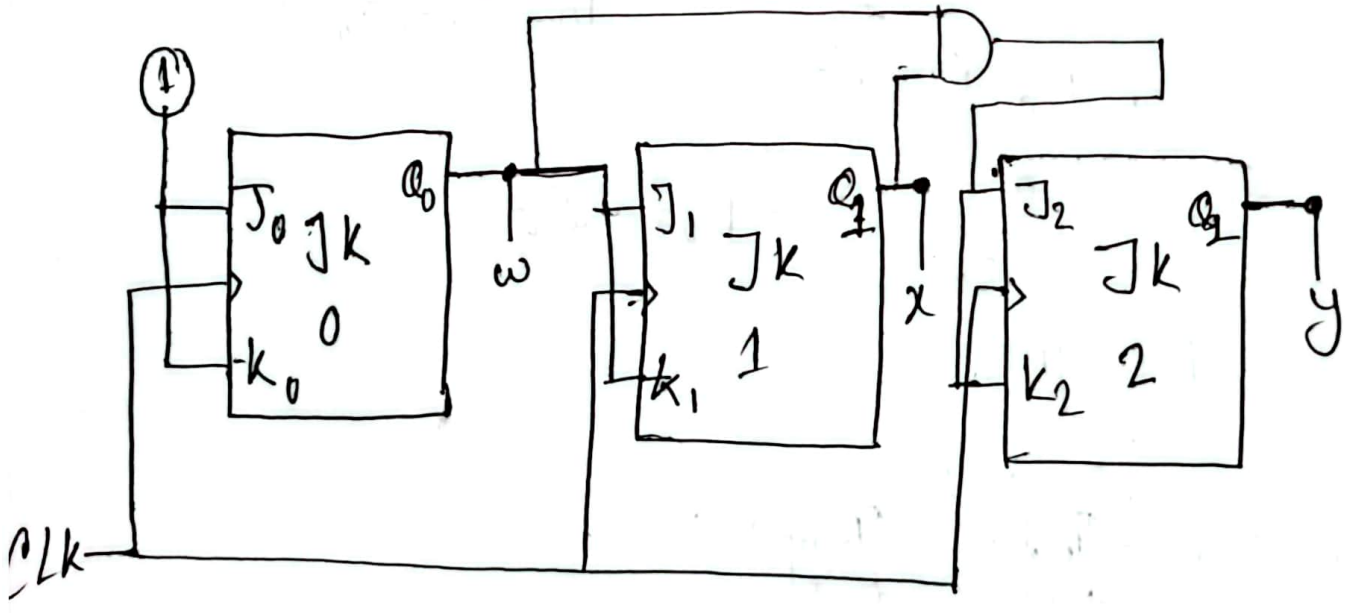
Q_2 \ Q_1Q_0	00	01	11	10
0	x	x	x	x
1	0	0	1	0

Q_1 (01, 11) ; Q_0 (11, 10)

$K_2 = Q_1 Q_0$

$J_0 = K_0 = 1$, $J_1 = K_1 = Q_0$, $J_2 = K_2 = Q_1 Q_0$

Circuit Diagram



Cost Analysis

Jk Flipflop

- Jk Flipflop gates : 3
  2 input AND gate : 1

Number of IC

Jk flipflop (7476) : 2

Cost : 2x35 = 70 tk

2 Input AND (7408) : 1

Cost : 30 = 30 tk

Total Jk Flipflop Cost = 100 tk

SOM cost with Jk

(563+100) = 663 tk

POM cost with Jk

(564+100) = 664 tk

SOP cost with Jk

(175+100) = 275 tk

POS cost with Jk

(292+100) = 392 tk

NAND cost with JK

(181+100) = 281 tk

NOR cost with JK

(285+100) = 385 tk

Multiplexer cost with JK

(128+100) = 228 tk

Decoder cost with JK

(185+100) = 285 tk

Cost Analysis (D-Flip Flop)

D Flip Flops : 3
X-OR gates : 1
2 Input AND gates : 2
2 Input OR gate : 1

Number of IC:

D Flip Flop → (2 × 50) = 100 tk
XOR IC → (1 × 25) = 25 tk
AND (7408) → (1 × 30) = 30 tk
OR (7432) → (1 × 30) = 30 tk
Total D-Flip Flop cost = 185 tk

SOM cost with D

(563 + 185) = 748 tk

POM cost with D

(564 + 185) = 749 tk

SOP cost with D

(175 + 185) = 360 tk

POS cost with D

(292 + 185) = 477 tk

NAND cost with D

(181 + 185) = 366 tk

NOR cost with D

(285 + 185) = 470 tk

MUX cost with D

(128 + 185) = 313 tk

Decoder cost with D

(185 + 185) = 370 tk

Cost Analysis (T-Flip-Flops)

T FlipFlops : 3
2 Input AND : 1

IC :

T FlipFlop IC : (2 × 50) = 100tk
2 Input AND(7408) : (1 × 30) = 30tk

Total T-flipFlop cost 130tk

SOM cost with T : (563 + 130) = 693tk

POM cost with T : (564 + 130) = 694tk

SOP cost with T : (175 + 130) = 305tk

POS cost with T : (282 + 130) = 412tk

NAND cost with T : (181 + 130) = 310tk

NOR cost with T : (285 + 130) = 415tk

mux cost with T : (128 + 130) = 258tk

Decoder cost with T : (185 + 130) = 315tk