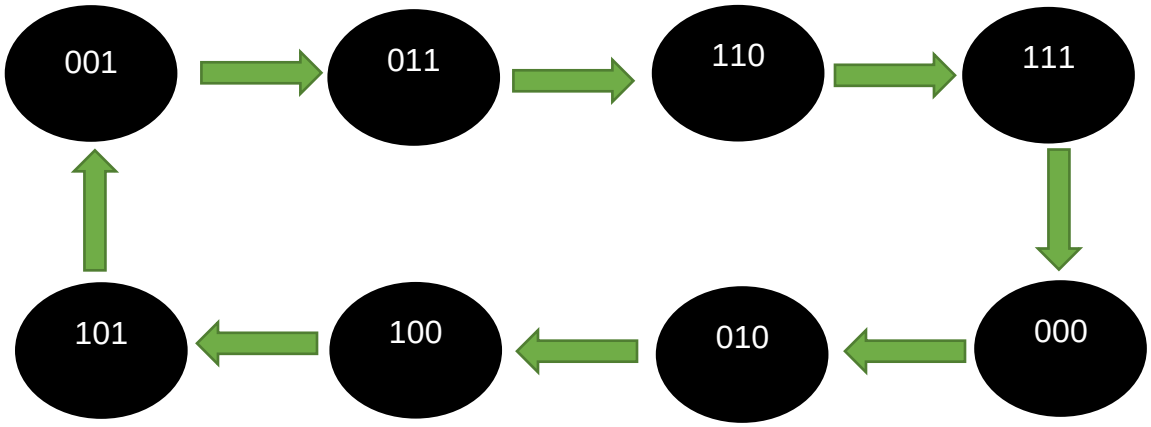
Experiment Design

Design the synchronous sequential counter circuit that counts periodically as 1 → 3 → 6 → 7 → 0 → 2 → 4 → 5 → using T flip flop?

1. State Diagram:

A state diagram visually represents a system's states and transitions triggered by specific events or conditions.



2. State Table:

A State Table is a tabular representation of a sequential circuit that shows all possible states, inputs, next states, and outputs.

Present State			Next State			Flip-Flops Input		
$Q_C(n)$	$Q_B(n)$	$Q_A(n)$	$Q_C(n+1)$	$Q_B(n+1)$	$Q_A(n+1)$	T_C	T_B	T_A
0	0	1	0	1	1	0	1	0
0	1	1	1	1	0	1	0	1
1	1	0	1	1	1	0	0	1
1	1	1	0	0	0	1	1	1
0	0	0	0	1	0	0	1	0
0	1	0	1	0	0	1	1	0
1	0	0	1	0	1	0	0	1
1	0	1	0	0	1	1	0	0

3. Excitation Table of T Flip-Flop:

Q(n)	Q(n+1)	T
0	0	0
0	1	1
1	0	1
1	1	0

4. Simplified Boolean Function of Flip Flop Input:

For T_A:

$Q_B Q_A$ / Q_C	00	01	11	10
0			1	
1	1		1	1

Equation 1:

$$T_A = Q_B Q_A + Q_C Q'_A \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1$$

For T_B:

$Q_B Q_A$ / Q_C	00	01	11	10
0	1	1		1
1			1	

Equation 2:

$$T_A = Q'_C Q'_B + Q'_C Q'_A + Q_C Q_B Q_A \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2$$

For T_C:

$Q_B Q_A$ \ Q_C	00	01	11	10
0			1	1
1		1	1	

Equation 3:

$$T_A = Q'_C\, Q_B + Q_C Q_A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3$$

5. Schematic Diagram From Circuitverse:

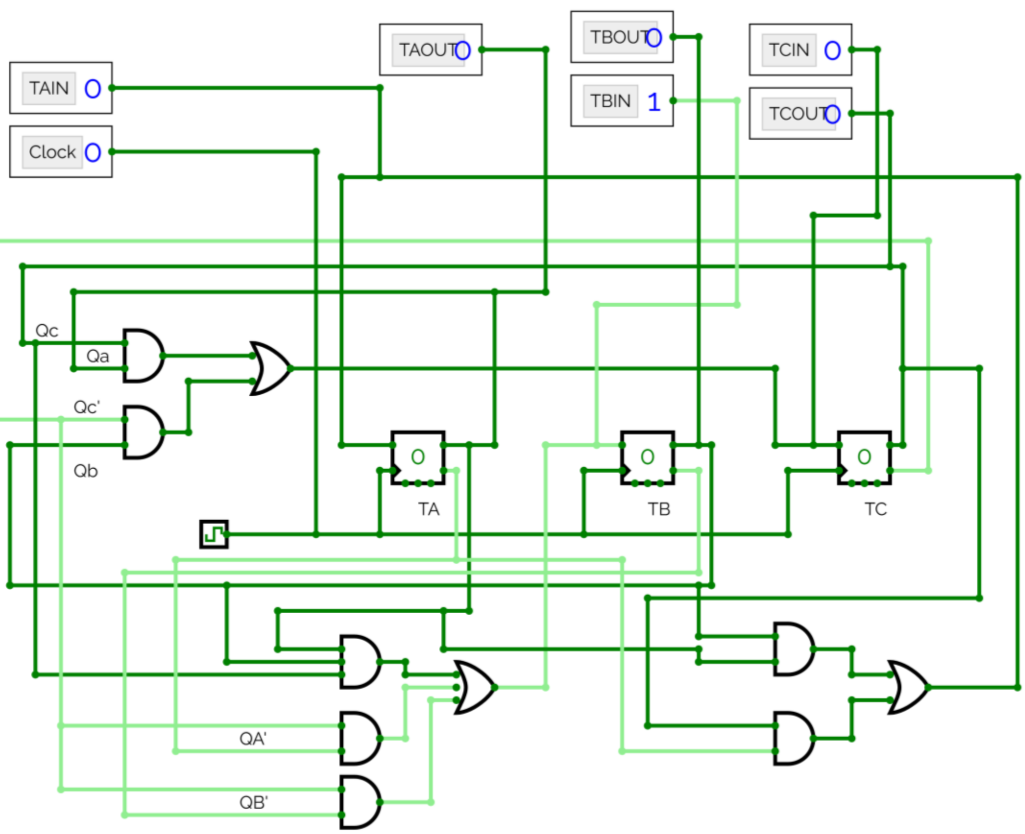


Figure 1: Schematic Diagram

6. Timing Diagram: