

COMPUTER ARCHITECTURE

Assignment Semester 1

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Module Name: Computer Architecture 1019Y

Question 1:

1) Mealy Machine State Diagram

Inputs: Y Z

Outputs : D Rtz

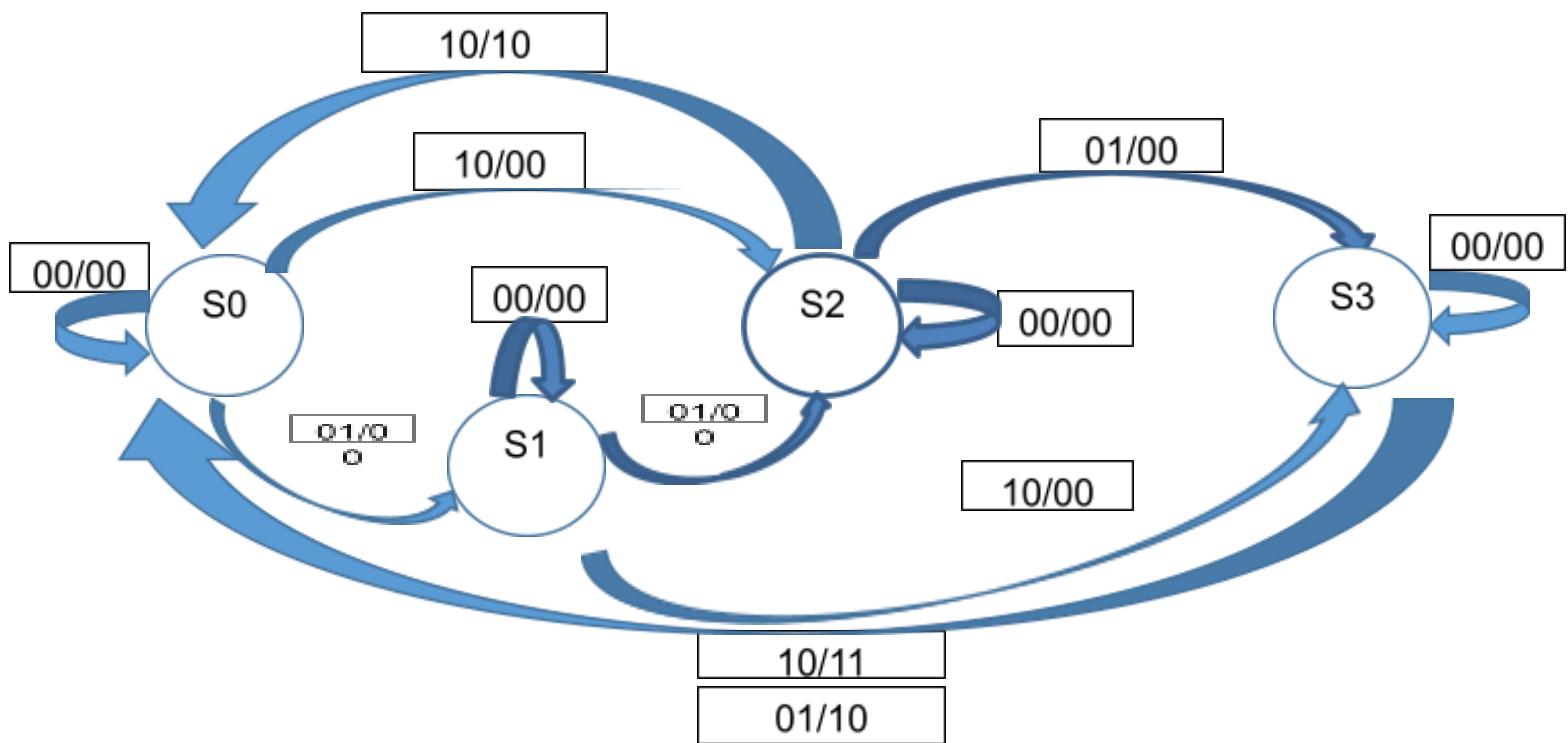
(KEY: Y Z/D Rtz)

S0(00) = Rs0

S1(01) = RS5

S2(10) = Rs10

S3(11) = Rs15



2) STATE TABLE

Present State		Inputs		Next State		Output		Flip Flop Inputs			
M1	M0	Y	Z	M1	M0	D	Rtz	Jm 0	Km 0	Jm 1	km 1
0	0	0	0	0	0	0	0	0	X	0	X
0	0	0	1	0	1	0	0	1	X	0	X
0	0	1	0	1	0	0	0	0	X	1	X
0	0	1	1	-	-	X	X	X	X	X	X
0	1	0	0	0	1	0	0	X	0	0	X
0	1	0	1	1	0	0	0	X	1	1	X
0	1	1	0	1	1	0	0	X	0	1	X
0	1	1	1	-	-	X	X	X	X	X	X
1	0	0	0	1	0	0	0	0	X	X	0
1	0	0	1	1	1	0	0	1	X	X	0
1	0	1	0	0	0	1	0	0	X	X	1
1	0	1	1	-	-	X	X	X	X	X	X
1	1	0	0	1	1	0	0	X	0	X	0
1	1	0	1	0	0	1	0	X	1	X	1
1	1	1	0	0	0	1	1	X	1	X	1
1	1	1	1	-	-	X	X	X	X	X	X

FOR JM0

		$YZ_{..}$	01	11	10	
		00	0	1	X	0
M1M0	00	X	X	X	X	
	01	X	X	X	X	
	11	X	X	X	X	
	10	0	1	X	0	

FOR KM0

	00	01	11	10
00	X	X	X	X
01	0	1	X	0
11	0	1	X	X
10	X	X	X	X

$$KMO = Z + M1.Y$$

YZ

M1M0

FOR JM1

$$JM1 = Y + M0.Z$$

YZ

M1M0

	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	0	1	X	1
10	0	0	X	1

FOR KM1

$$KM1 = Y + M0.Z$$

YZ

M1M0

	00	01	11	10
00	0	0	X	1
01	0	1	X	1
11	X	X	X	X
10	X	X	X	X

FOR D

$$D = M_1.Y + M_1.M_0.Z$$

YZ

M1M
O

FOR R

R

	00	01	11	10
00	0	0	X	0
01	0	0	X	0
11	0	1	X	1
10	0	0	X	1

$$= M_1.M_0.Y$$

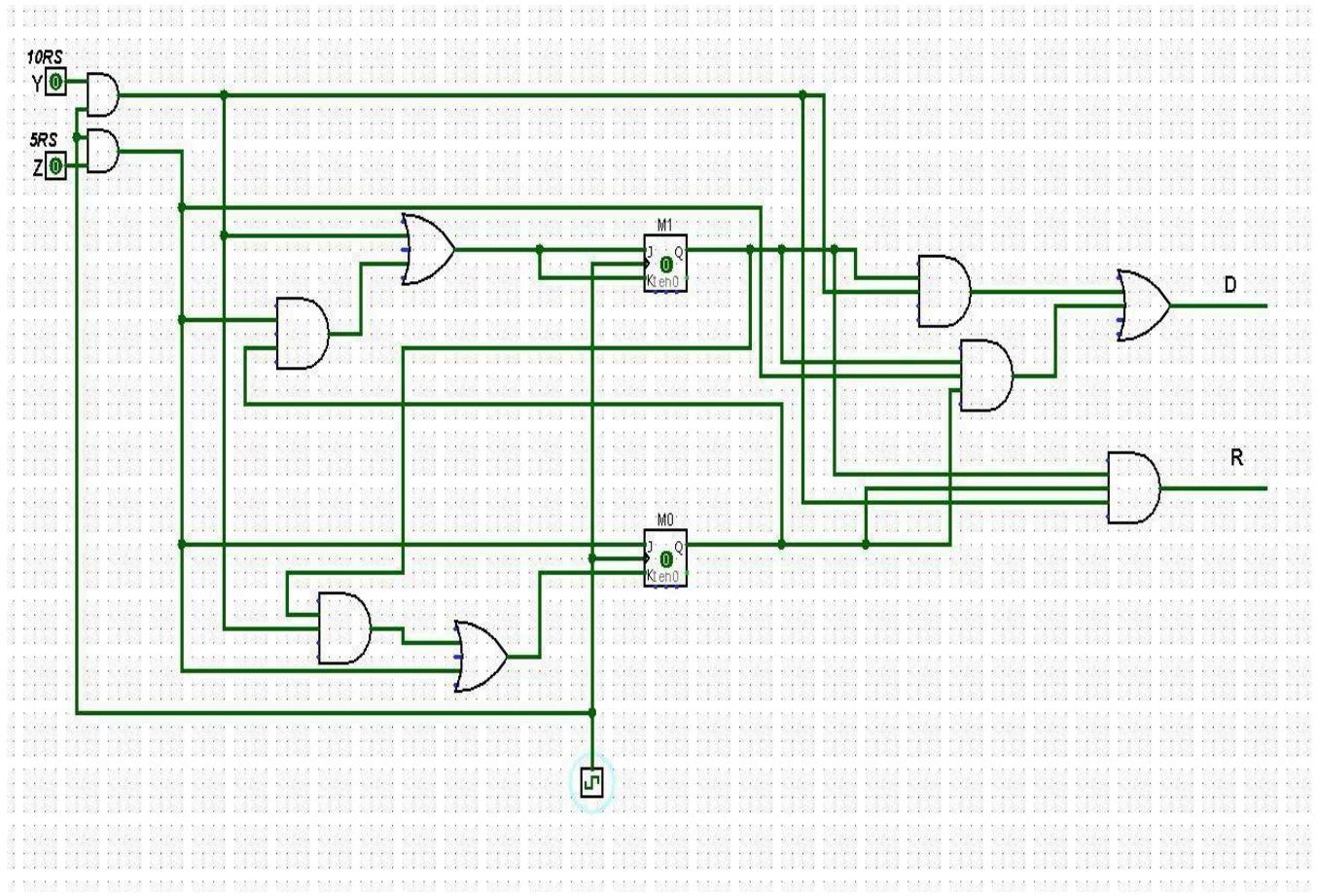
YZ

M1M
O

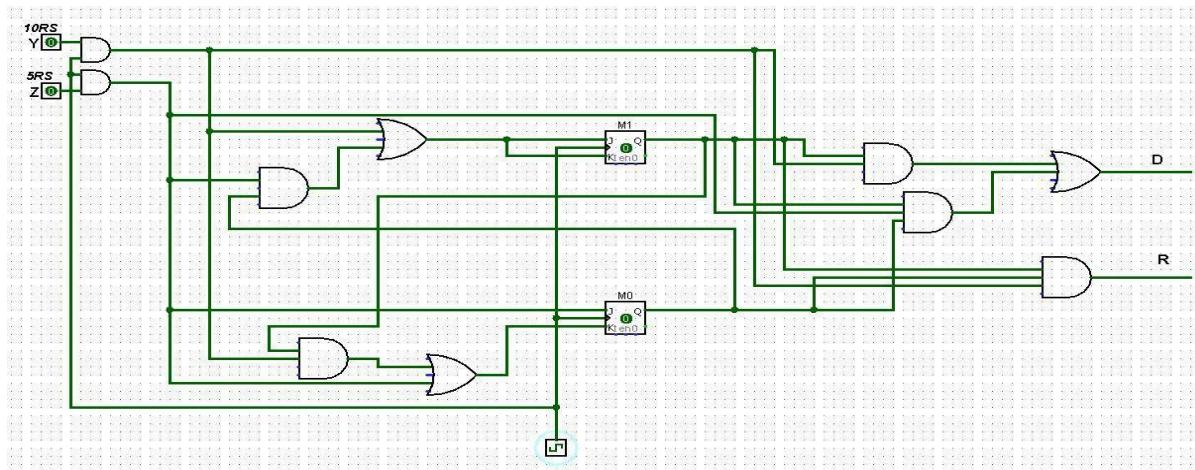
	00	01	11	10
00	0	0	X	0
01	0	0	X	0
11	0	0	X	1
10	0	1	X	0

4) **LOGICISM CIRCUITS ILLUSTRATION**

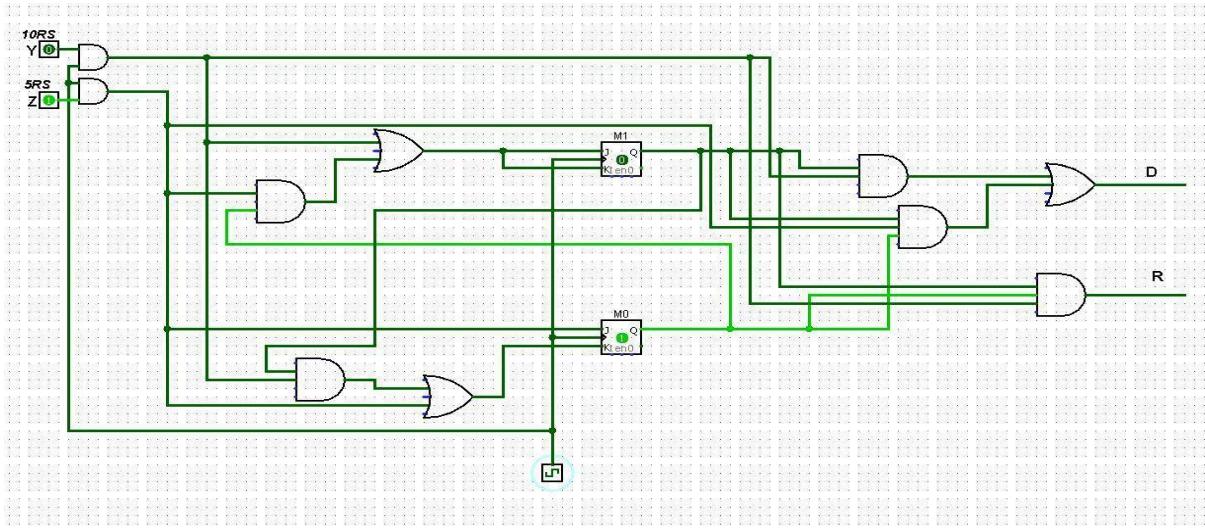
Original circuit



1.00/00
 State Change
 When No Coin is Inserted At State 0



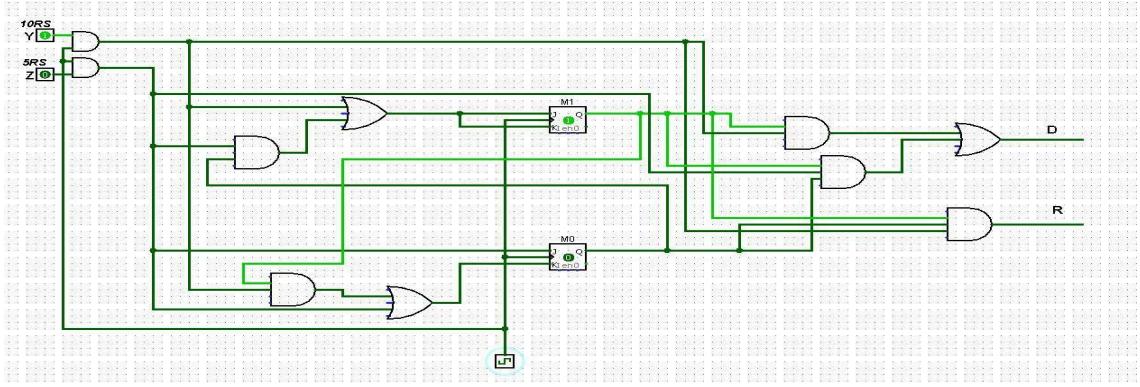
2.00/01
 State Change
 When A 5rs Coin (Z) is Inserted At State 0



3.00/10

State Change

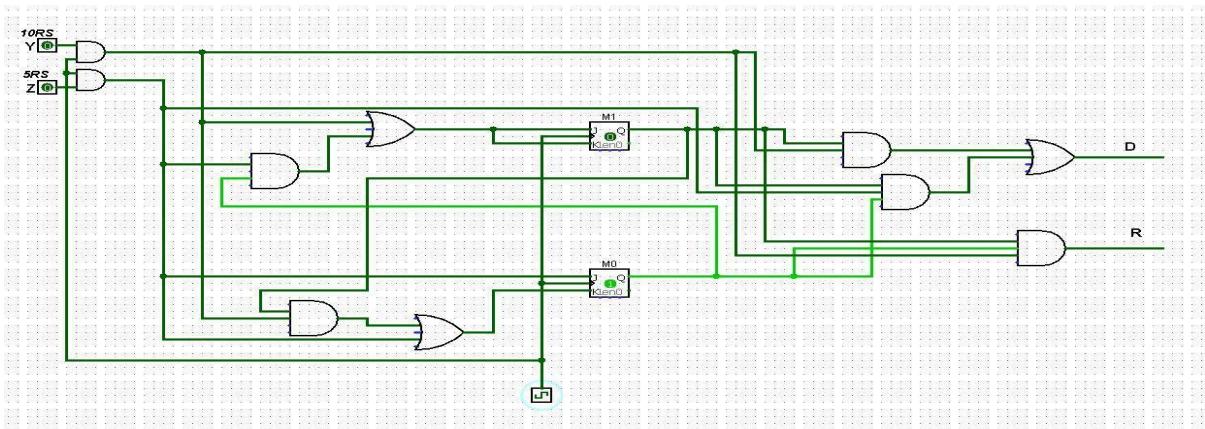
When A 10rs Coin(Y) is Inserted At State 0



4.01/00

State Change

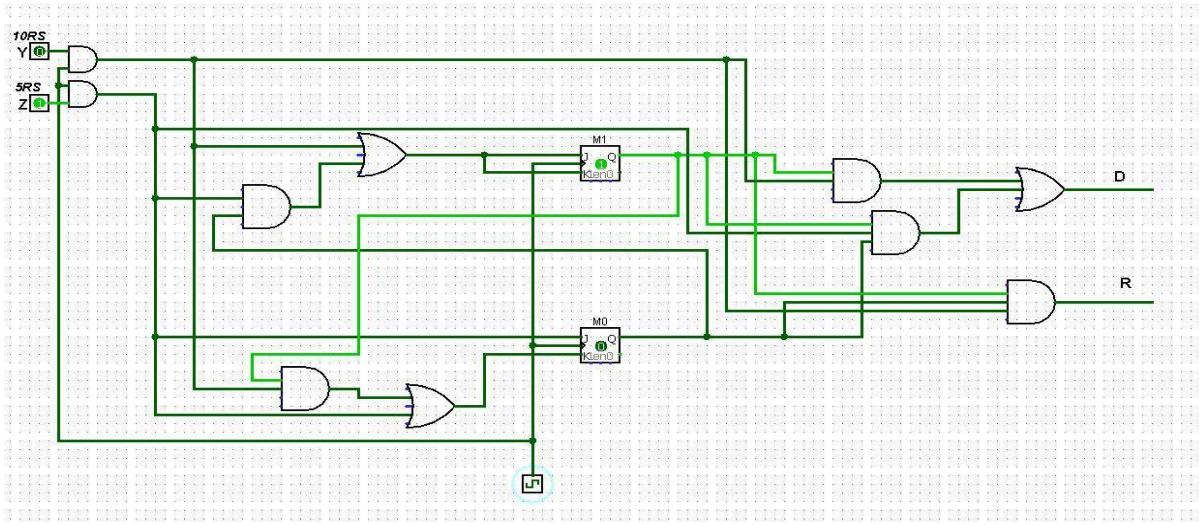
When No Coin is Inserted At State 1



5.01/01

State Change

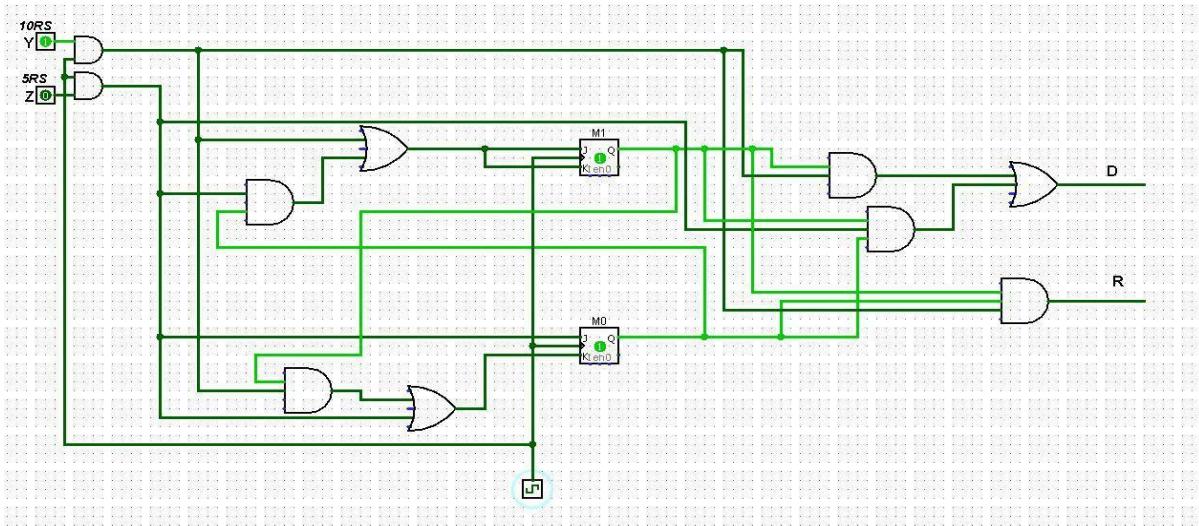
When A 5rs Coin(Z) is Inserted At State 1



6.01/10

State Change

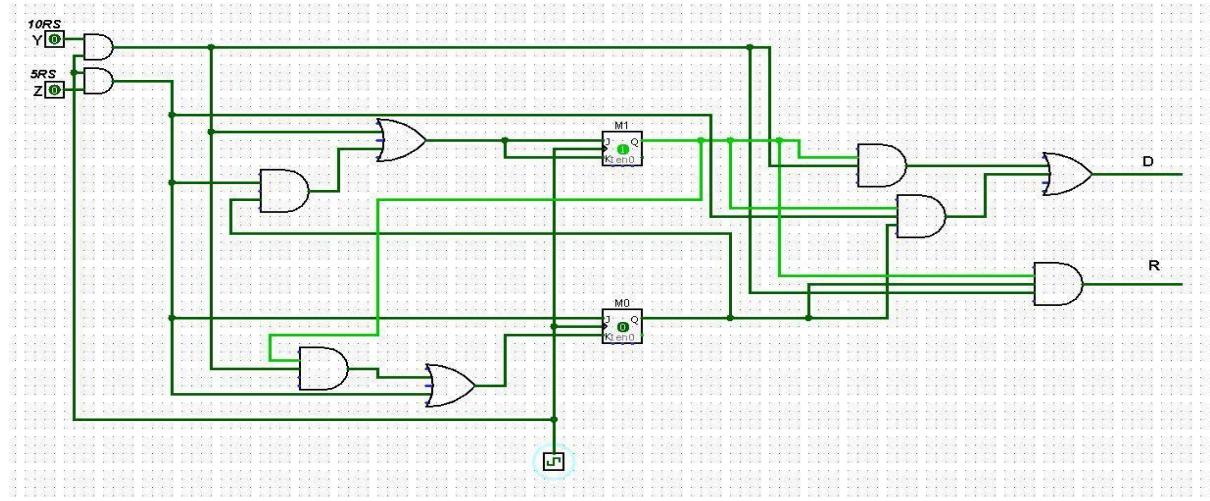
When A 10rs Coin(Y) is Inserted At State 1



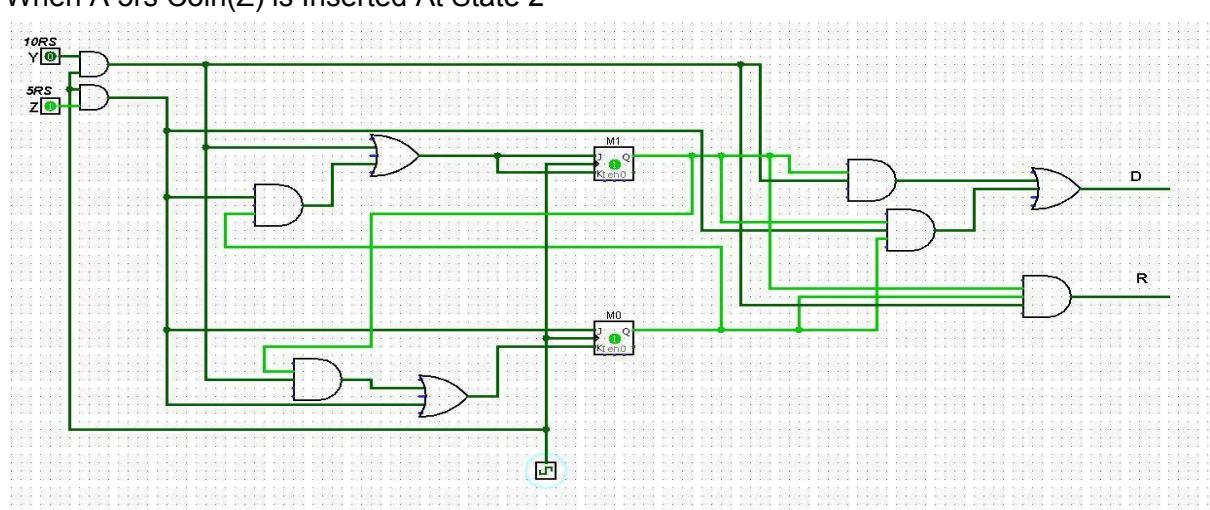
7.10/00

State Change

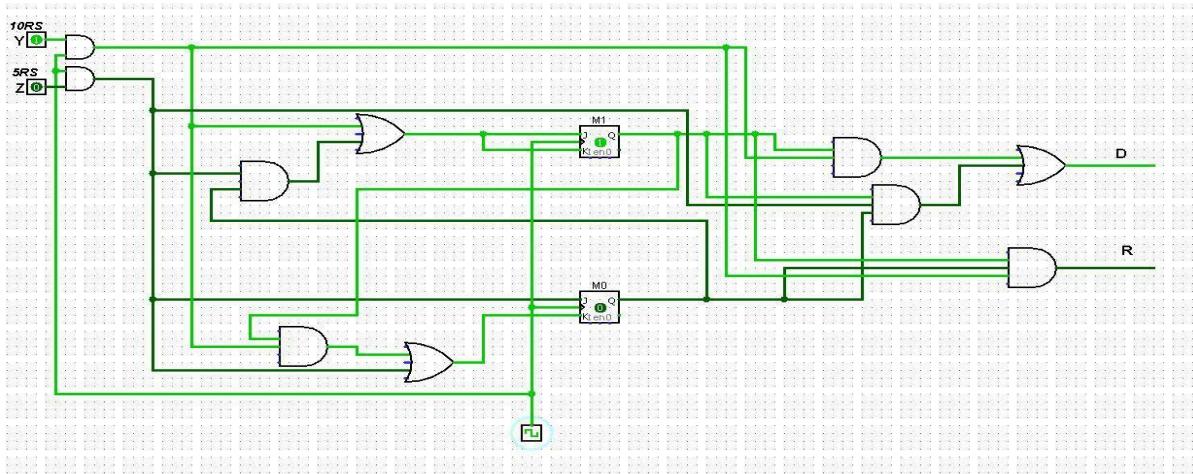
When No Coin is Inserted At State 2



8. 10/01
State Change
When A 5rs Coin(Z) is Inserted At State 2



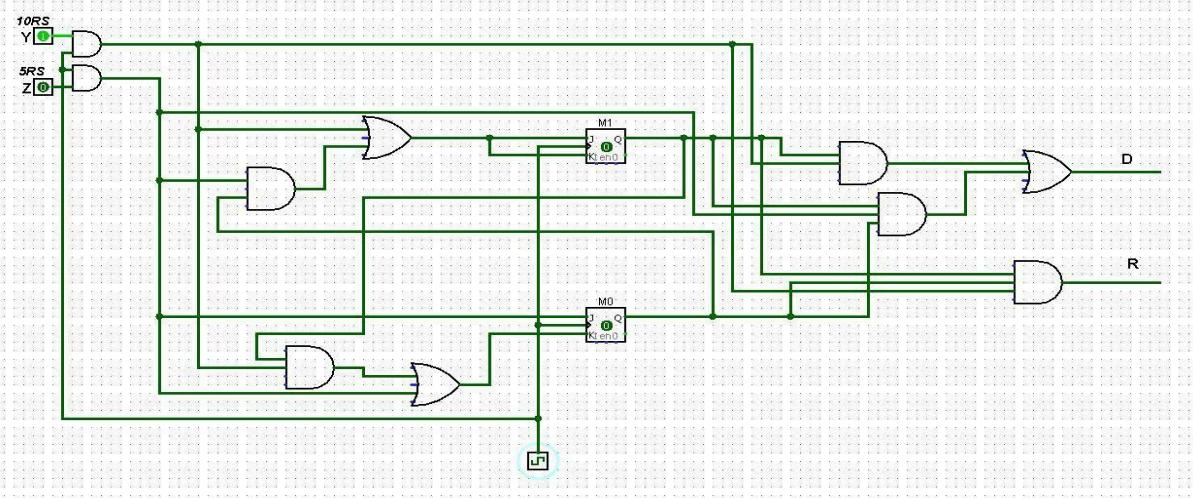
9.10/10
Dispenser Output
When A 10rs Coin(Y) is Inserted At State 2



10.10/10

State Change

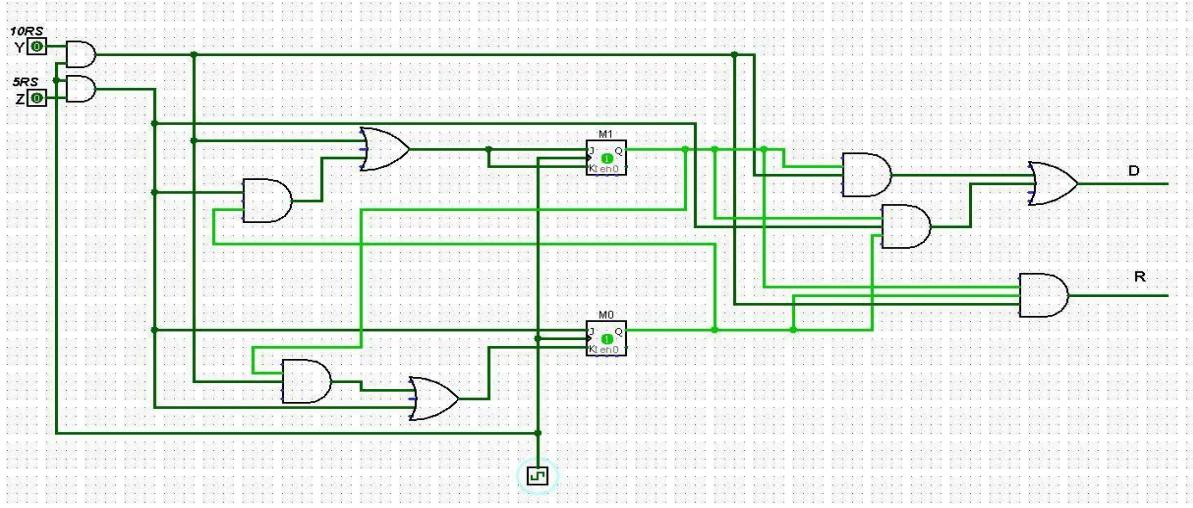
When A 10rs Coin(Y) is Inserted At State 2



11.11/00

State Change

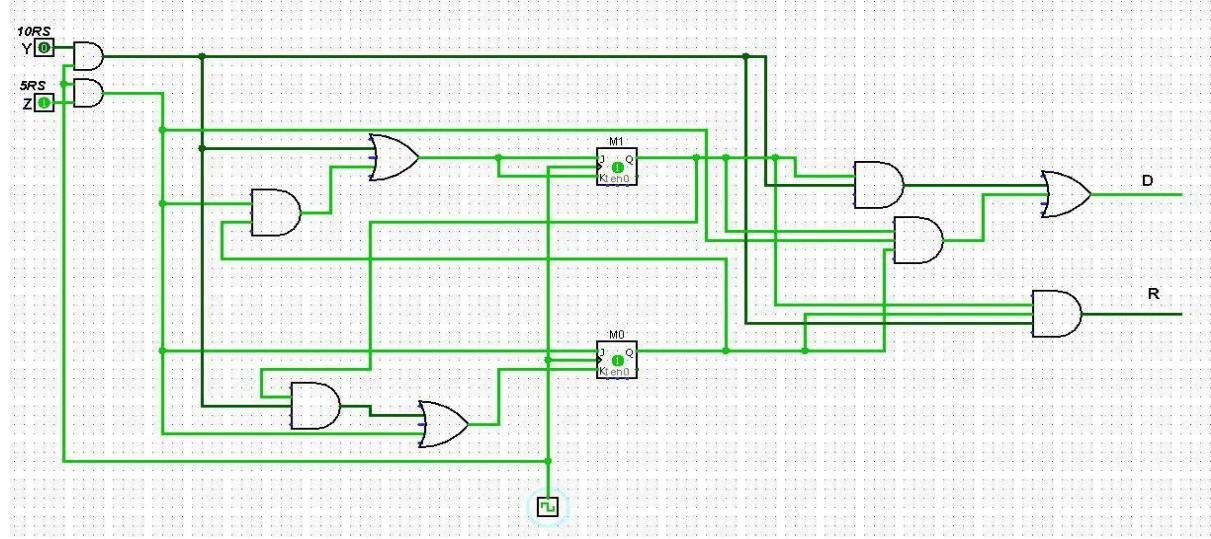
When No Coin is Inserted At State 3



12.11/01

Dispenser Output

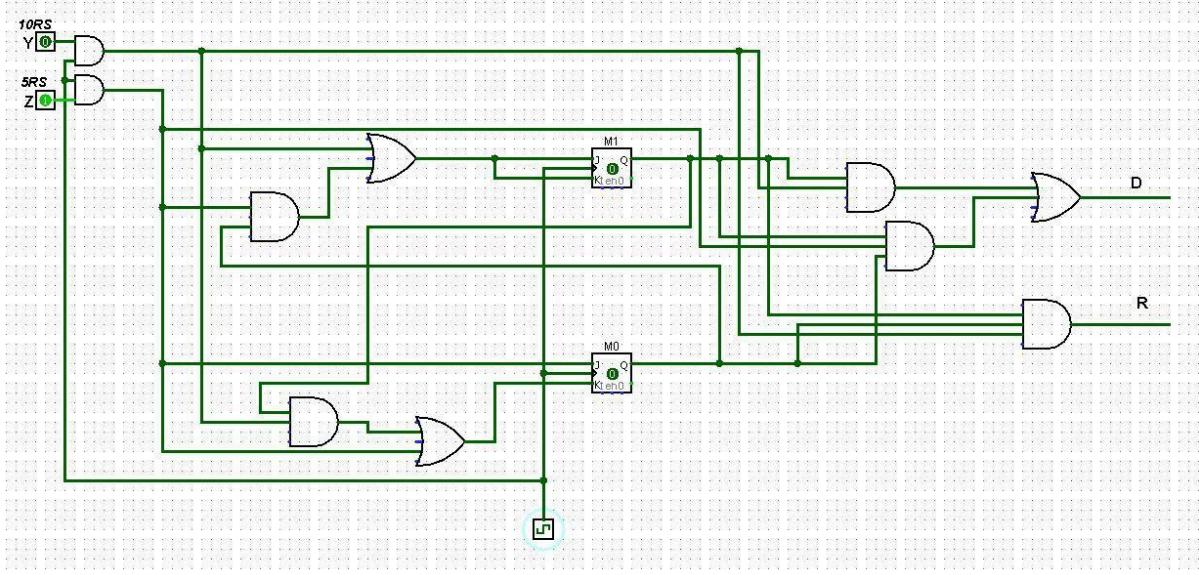
When A 5rs Coin(Z) is Inserted At State 3



13.11/01

State Change

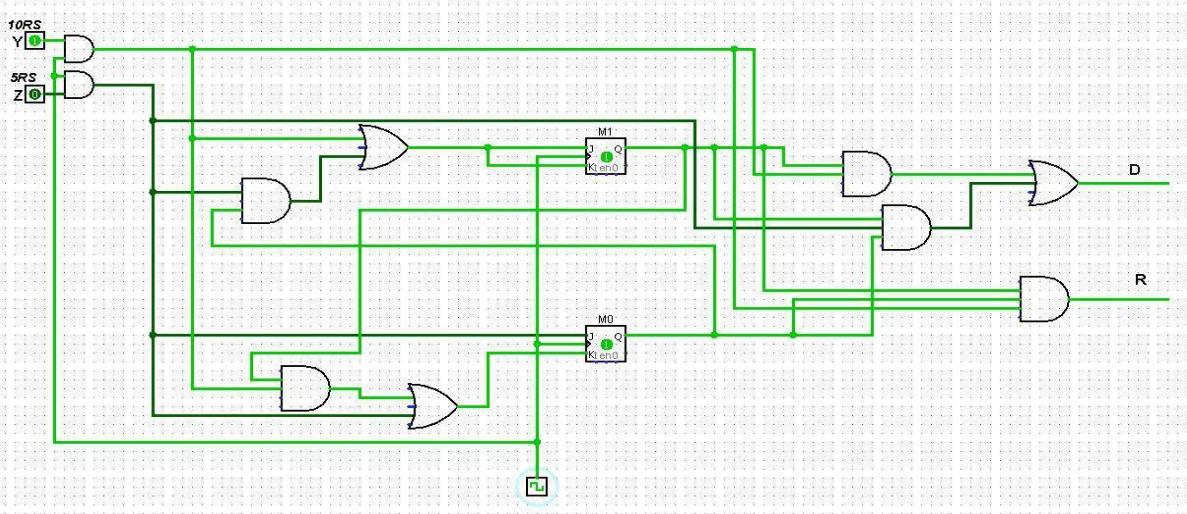
When A 5rs Coin(Z) is Inserted At State 3



14.11/10

Dispenser Outputs And Return

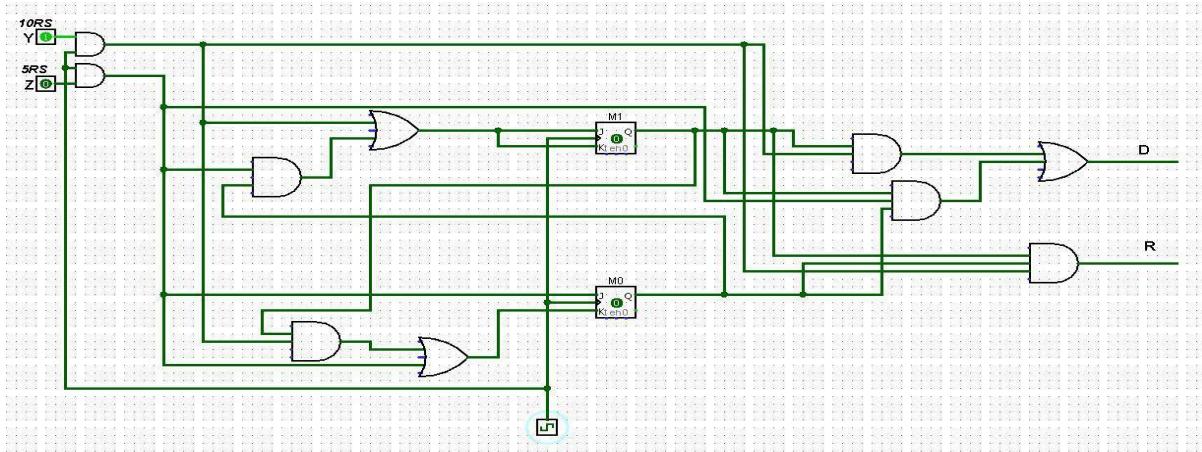
When A 10rs Coin(Z) is Inserted At State 3



15.11/10

State Change

When A 10rs Coin(Y) is Inserted At State 3



2) State Table

States	Present State			Inputs	Next State			Output	Flip Flops		Output			
	M2	M1	M0		M2	M1	M0		Jm2	Km2	Jm1	Km1	Jm0	Km0
S0	0	0	0	0	0	0	0	0	0	X	0	X	0	X
	0	0	0	1	0	0	1	0	0	X	0	X	1	X
S1	0	0	1	0	1	0	0	0	1	X	0	X	X	1
	0	0	1	1	0	1	0	0	0	X	1	X	X	1
S2	0	1	0	0	1	0	0	0	1	X	X	1	0	X
	0	1	0	1	0	1	1	0	0	X	X	0	1	X
S3	0	1	1	0	1	0	0	0	1	X	X	1	X	1
	0	1	1	1	0	1	1	1	0	X	X	0	X	0
S4	1	0	0	0	1	0	1	0	X	0	0	X	1	X
	1	0	0	1	0	0	1	0	X	1	0	X	1	X
S5	1	0	1	0	0	0	0	0	X	1	0	X	X	1
	1	0	1	1	0	0	1	1	X	1	0	X	X	0
-	1	1	0	0	-	-	-	X	X	X	X	X	X	X
-	1	1	0	1	-	-	-	X	X	X	X	X	X	X
-	1	1	1	0	-	-	-	X	X	X	X	X	X	X
-	1	1	1	1	-	-	-	X	X	X	X	X	X	X

FOR JM0

X

	00	01	11	10	JM0 = M2 +
00	0	1	X	X	
01	MOX		1	X	X
11	X	X	X	X	
10	1	1	X	X	

M2M
1

FOR KM0

	00	01	11	10
00	X	X	1	1
01	X	X	0	1
11	X	X	X	X
10	X	X	0	1

$$KMO = X' + M2'.M1'$$

MOX

M2M1

FOR JM1

$$JM1 = M0.X.M2'$$

		M0X			
		00	01	11	10
M2M1	00	X	X	X	X
	01	1	0	0	1
	11	X	X	X	X
	10	X	X	X	X

FOR KM1

$$KM1 = X'$$

		M0X			
		00	01	11	10
M2M 1	00	0	0	1	0
	01	X	X	X	X
	11	X	X	X	X
	10	0	0	0	0

FOR JM2

$$JM2 = M0.X' + M1.X'$$

M0X

M2M
1

	00	01	11	10
00	0	0	0	1
01	1	0	0	1
11	X	X	X	X
10	X	X	X	X

FOR KM2

$$KM2 = M0 + X$$

M0X

M2M1

	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	X	X	X	X
10	0	1	1	1

FOR T

$$T = M_0.X.M_1 + M_0.X.M_2$$

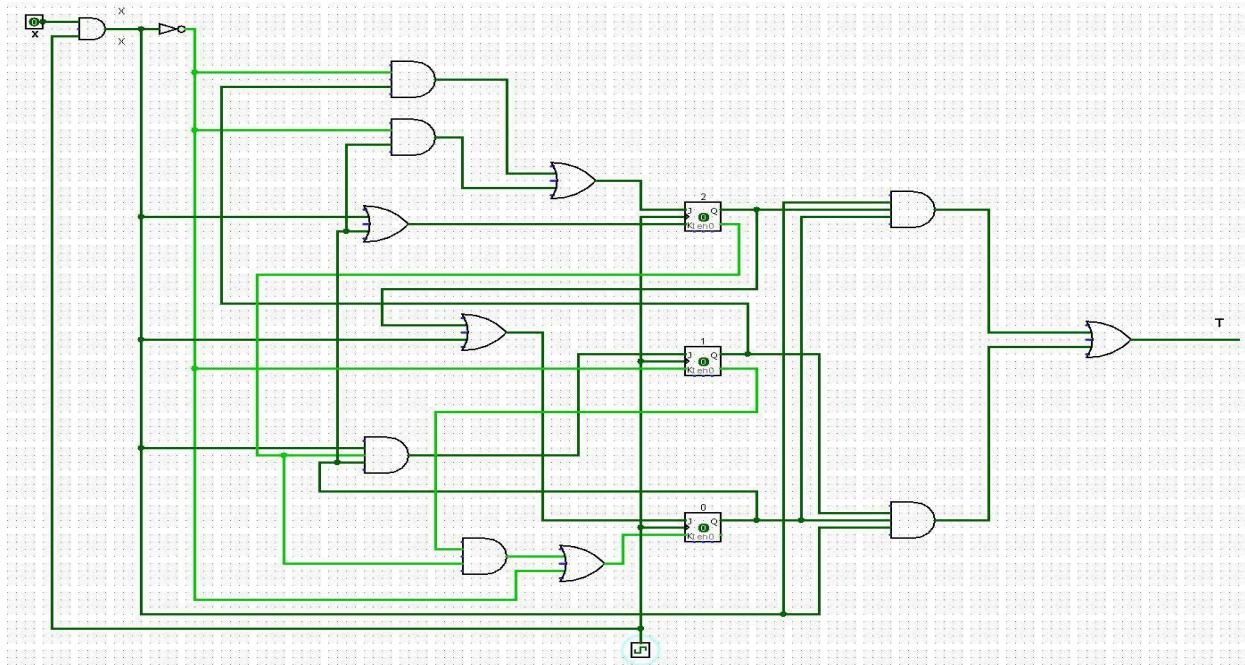
M0X

	00	01	11	10
00	0	0	0	0
01	0	0	1	0
11	X	X	X	X
10	0	0	1	0

1.000/0

State Change (0 to 0)

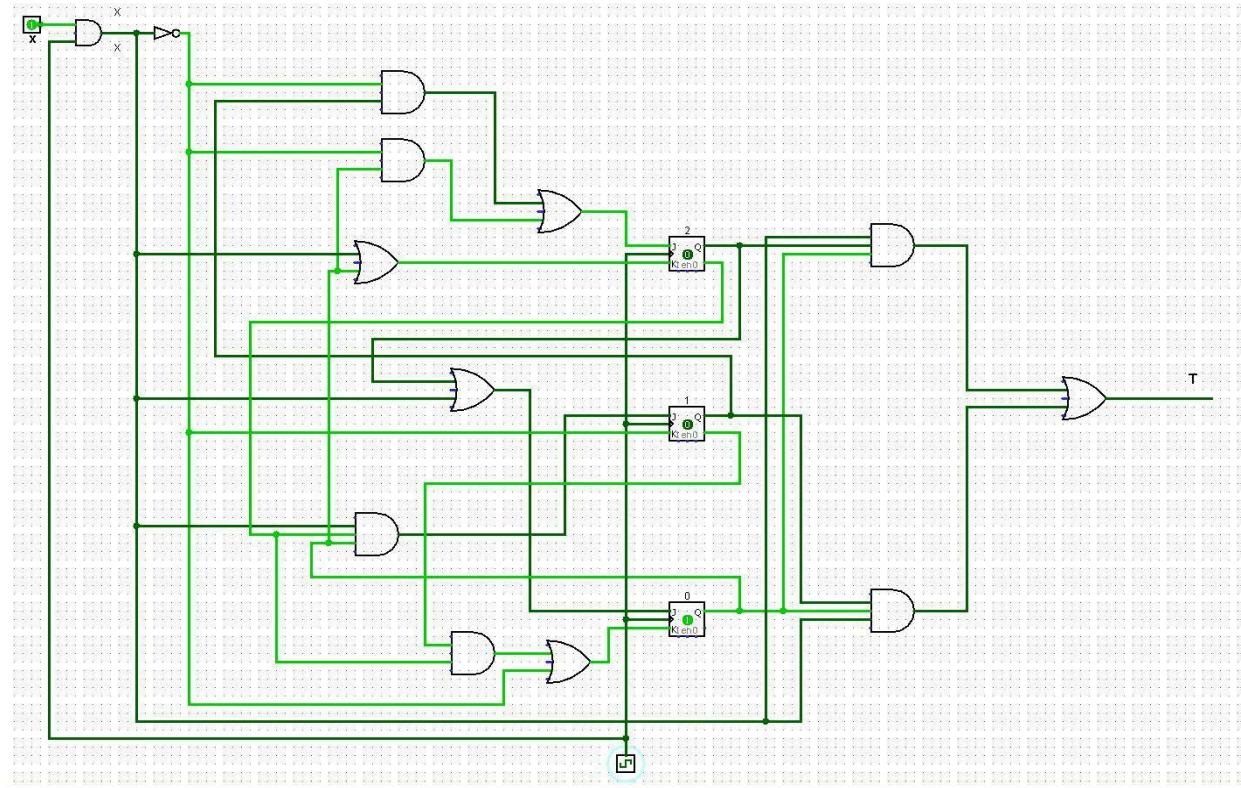
When 0 is entered at X when in State 0



2.000/1

State Change (0 to 1)

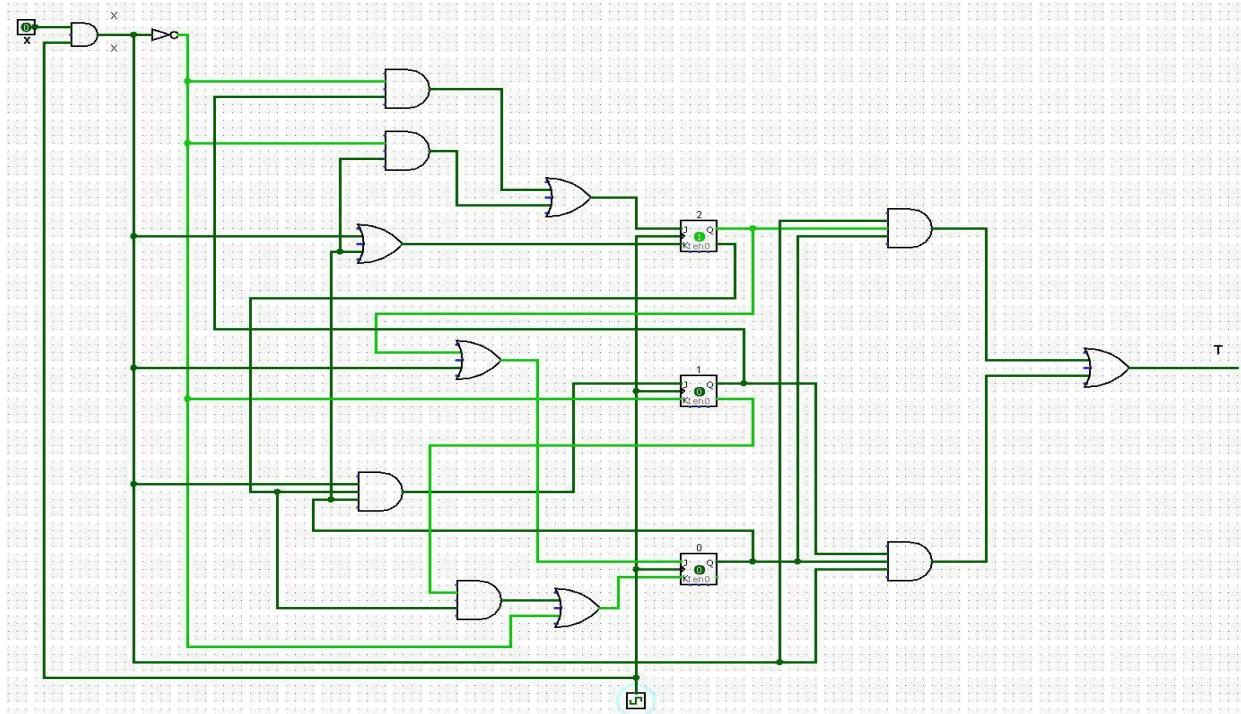
When 1 is entered at X when in State 0



3.001/0

State Change(1 to 4)

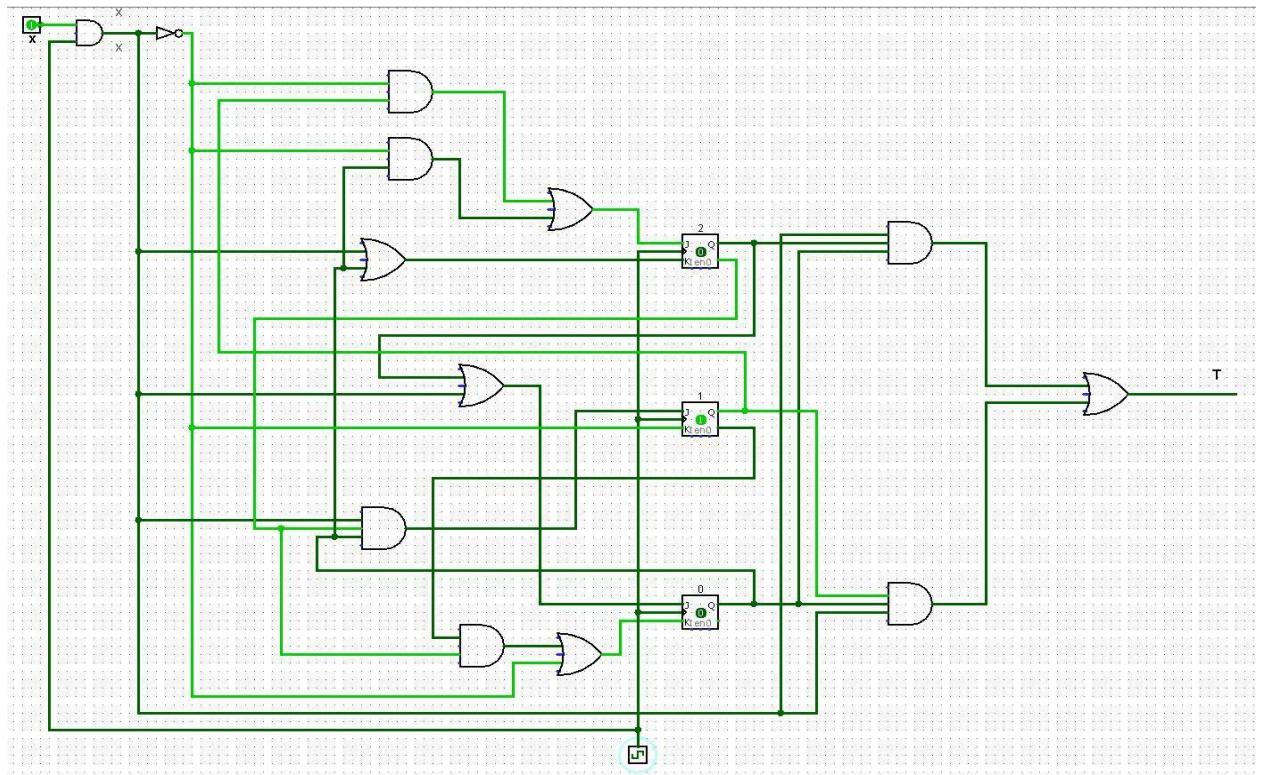
When 0 is entered at X when in State 1



4.001/1

State Change (1 to 2)

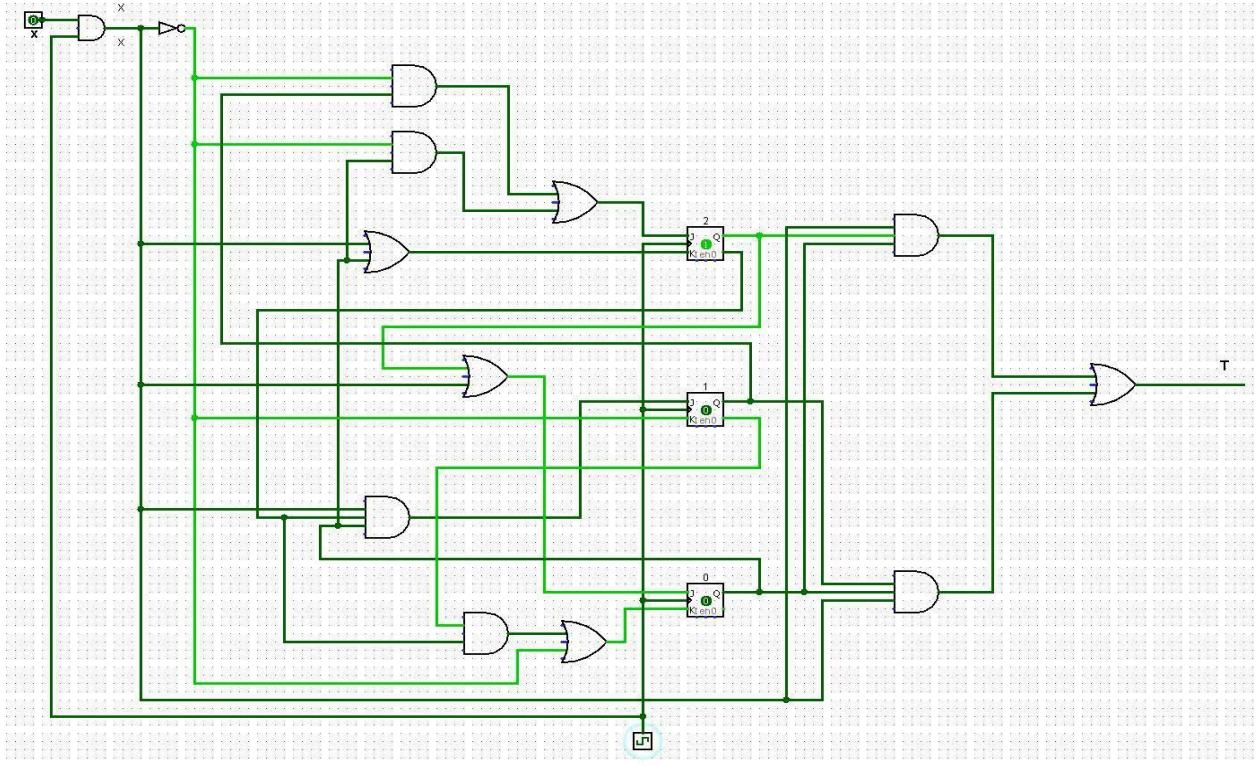
When 1 is entered at X when in State 1



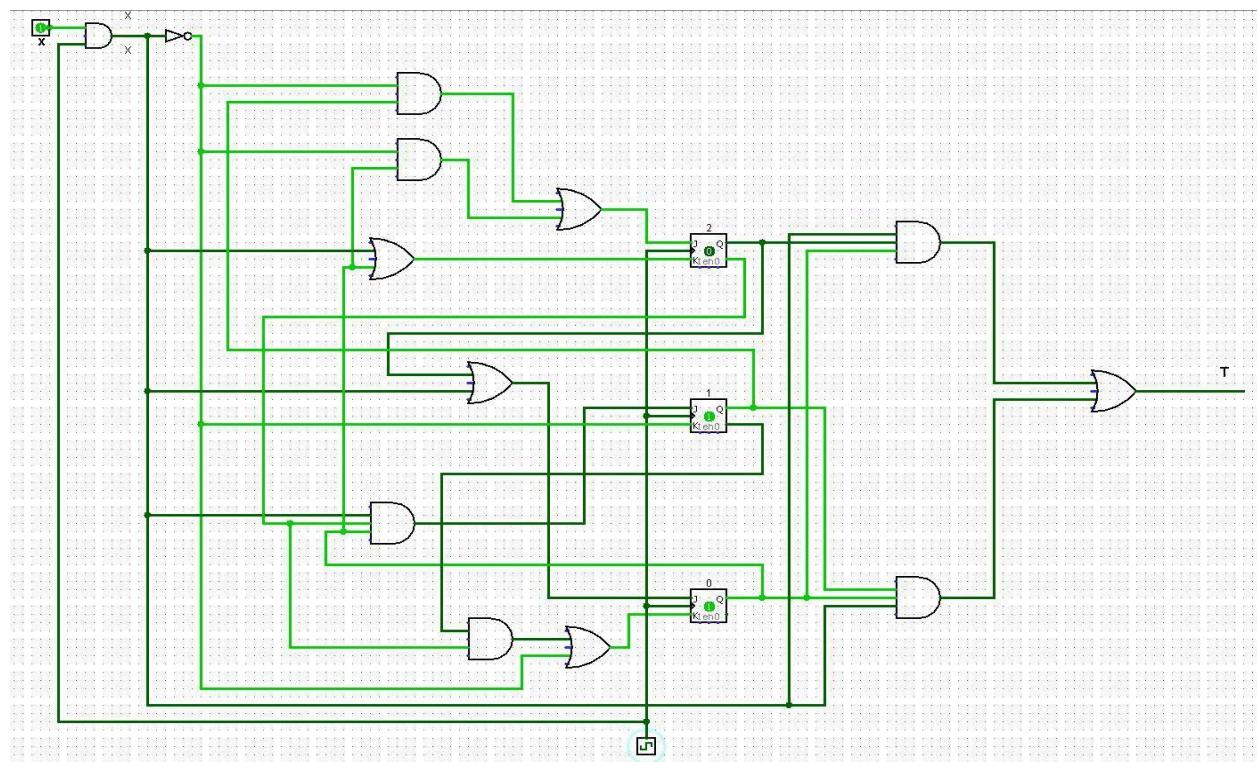
5.010/0

State Change (2 to 4)

When 0 is entered at X when in State 2



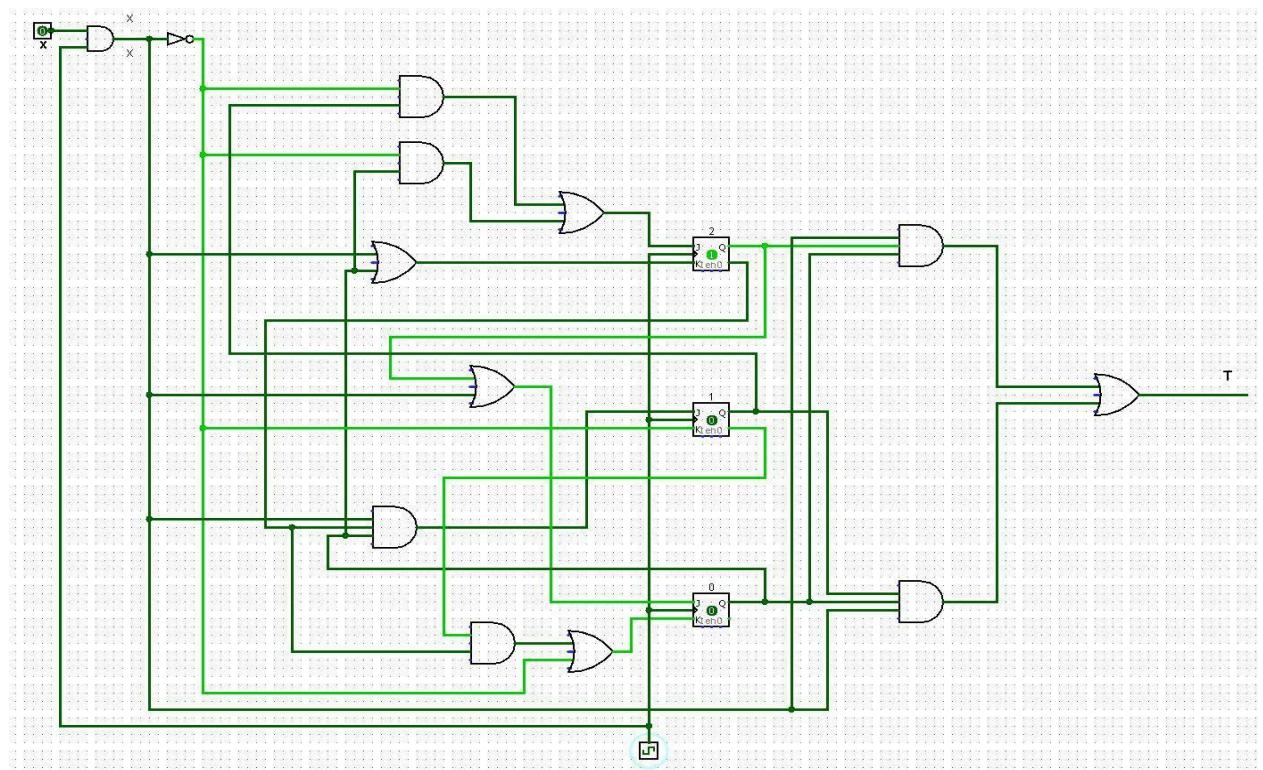
6.010/1
 State Change (2 to 3)
 When 1 is entered at X when in State 2



7.011/0

State Change (3 to 4)

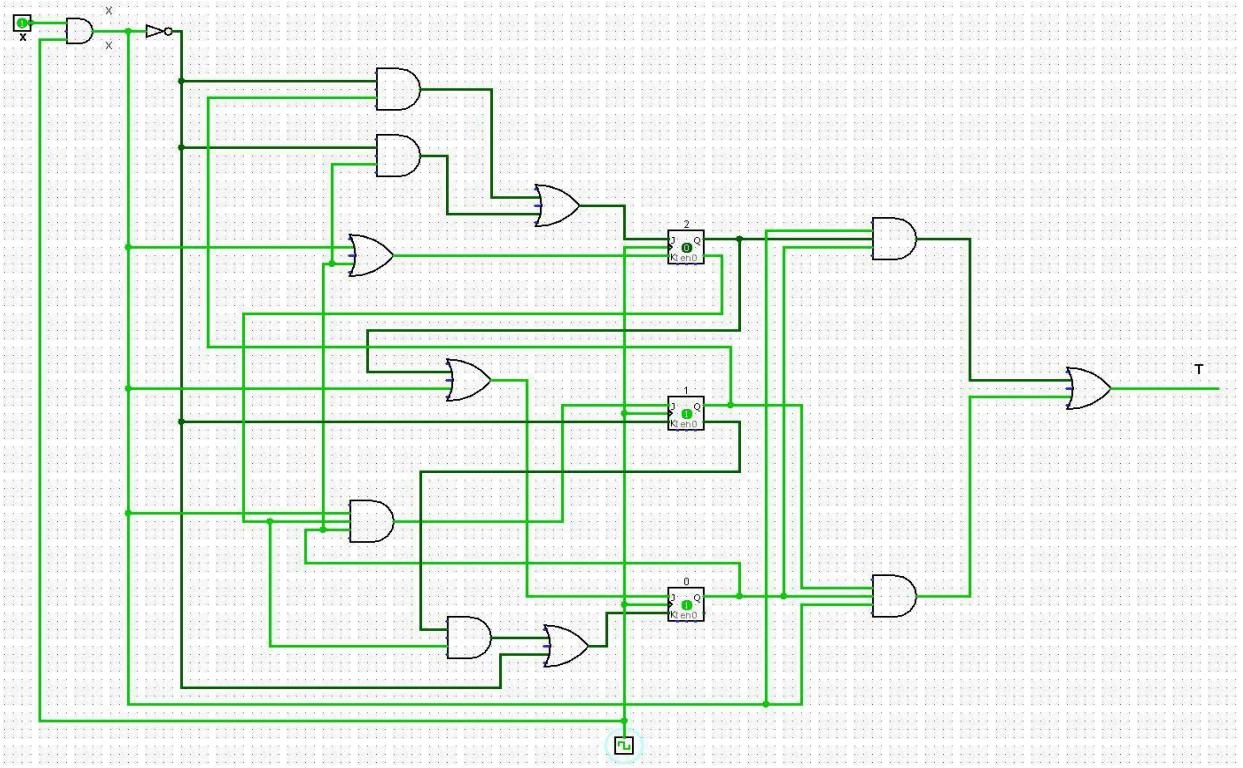
When 0 is entered at X when in State 3



8.011/1

Output 1 After preceding 1111 inputs

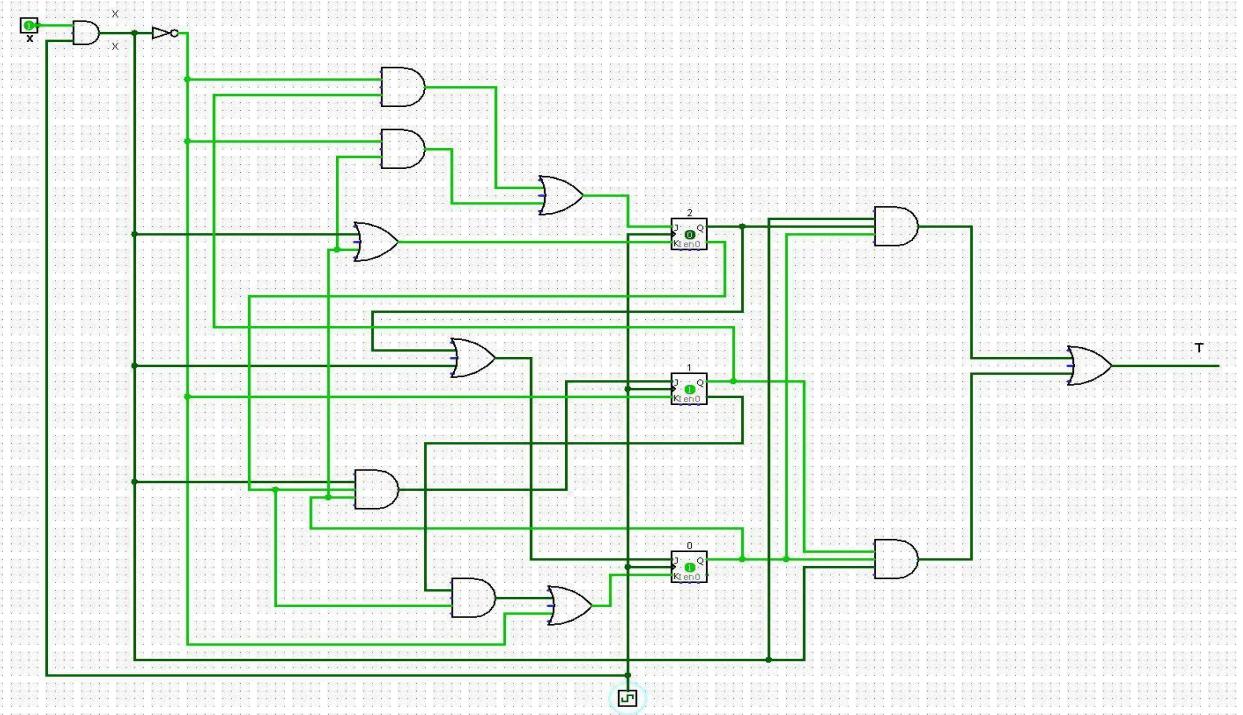
When 1 is entered at X when in State 3



9.011/1

State Change (3 to 3)

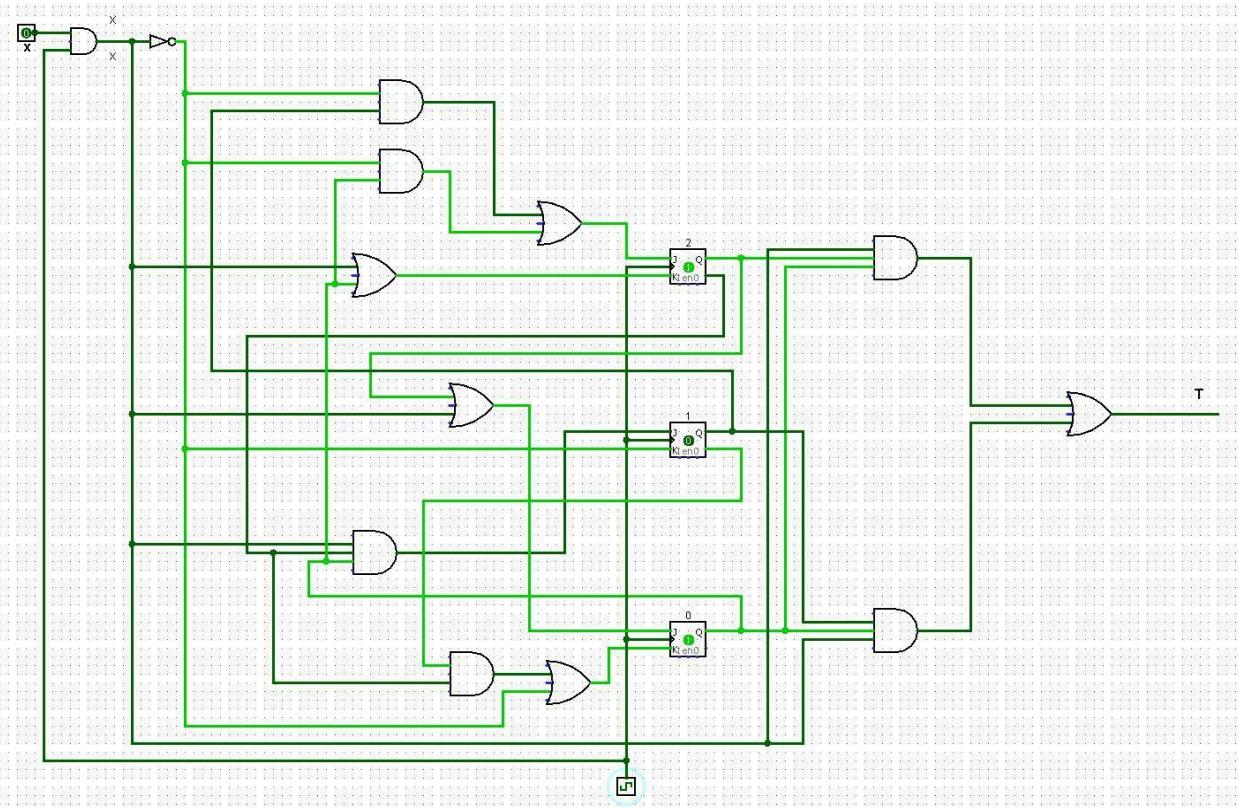
When 1 is entered at X when in State 3



10. 100/0

State Change (4 to 5)

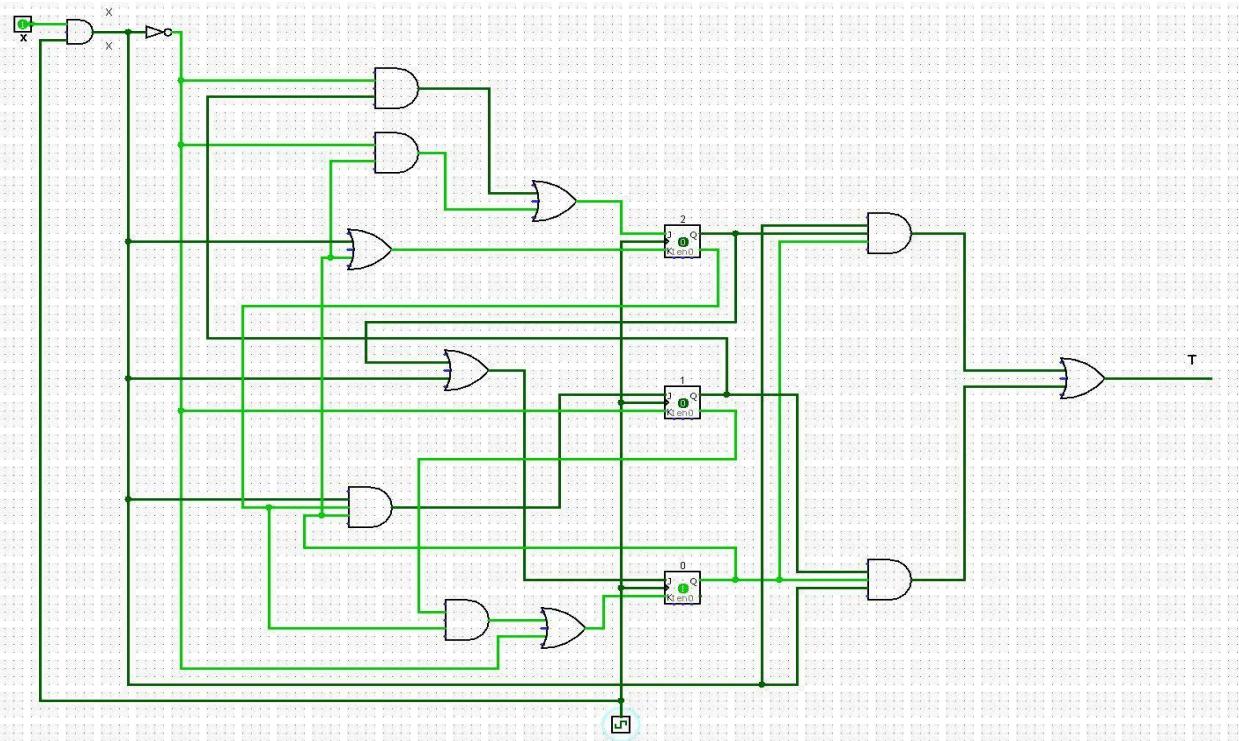
When 1 is entered at X when in State 4



11.100/1

State Change (4 to 5)

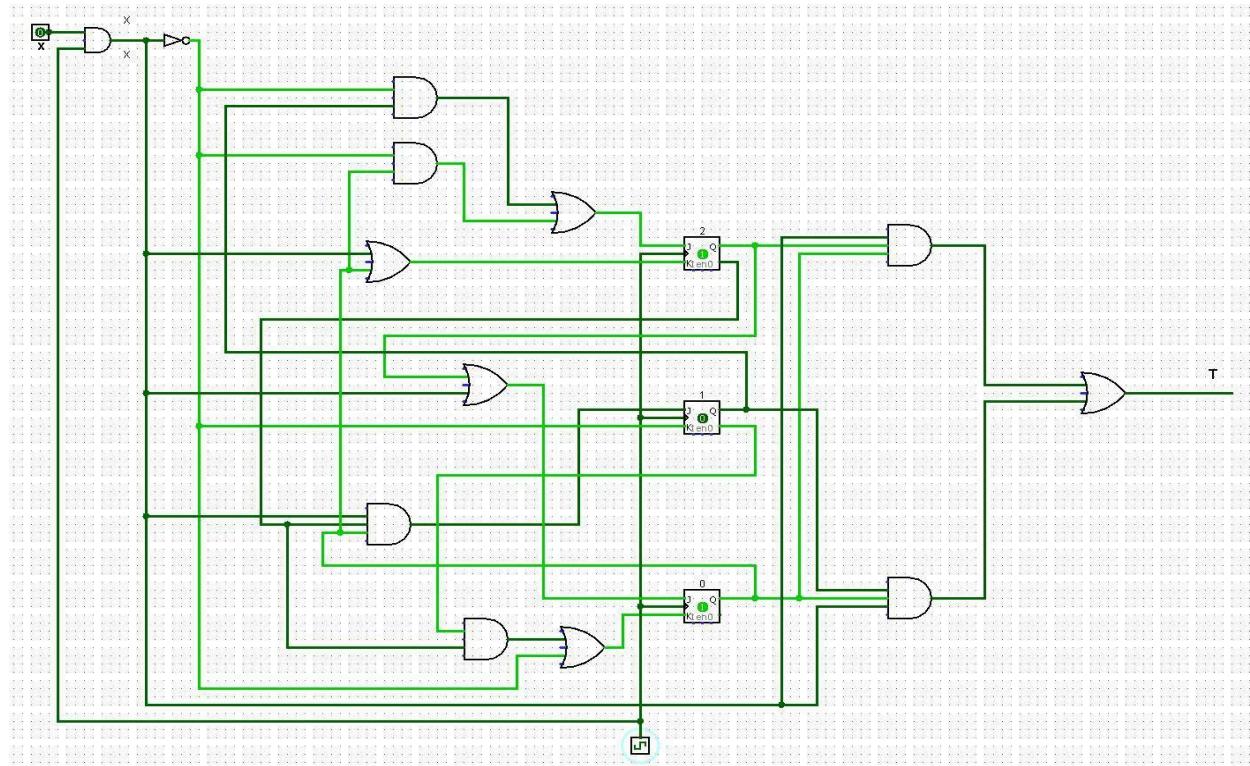
When 1 is entered at X when in State 4



12.101/0

State Change (5 to 0)

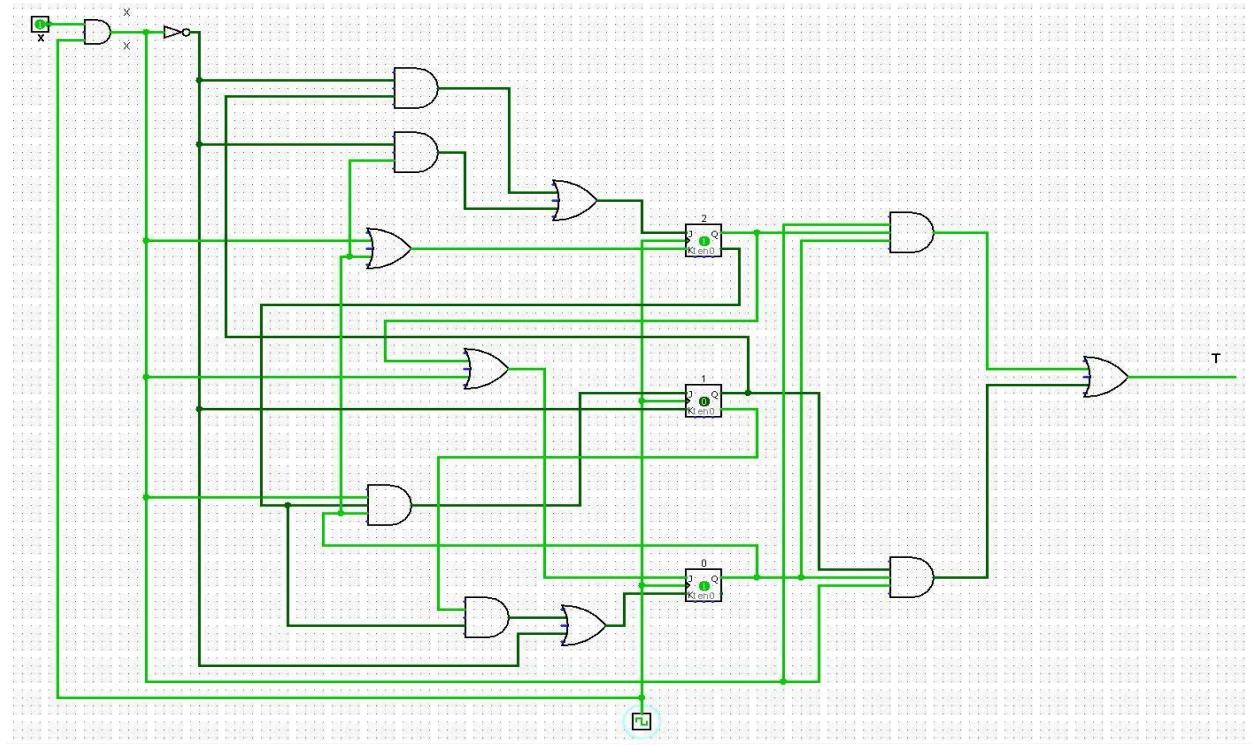
When 0 is entered at X when in State 5



13. 101/1

Output 1 After preceding 1001 inputs

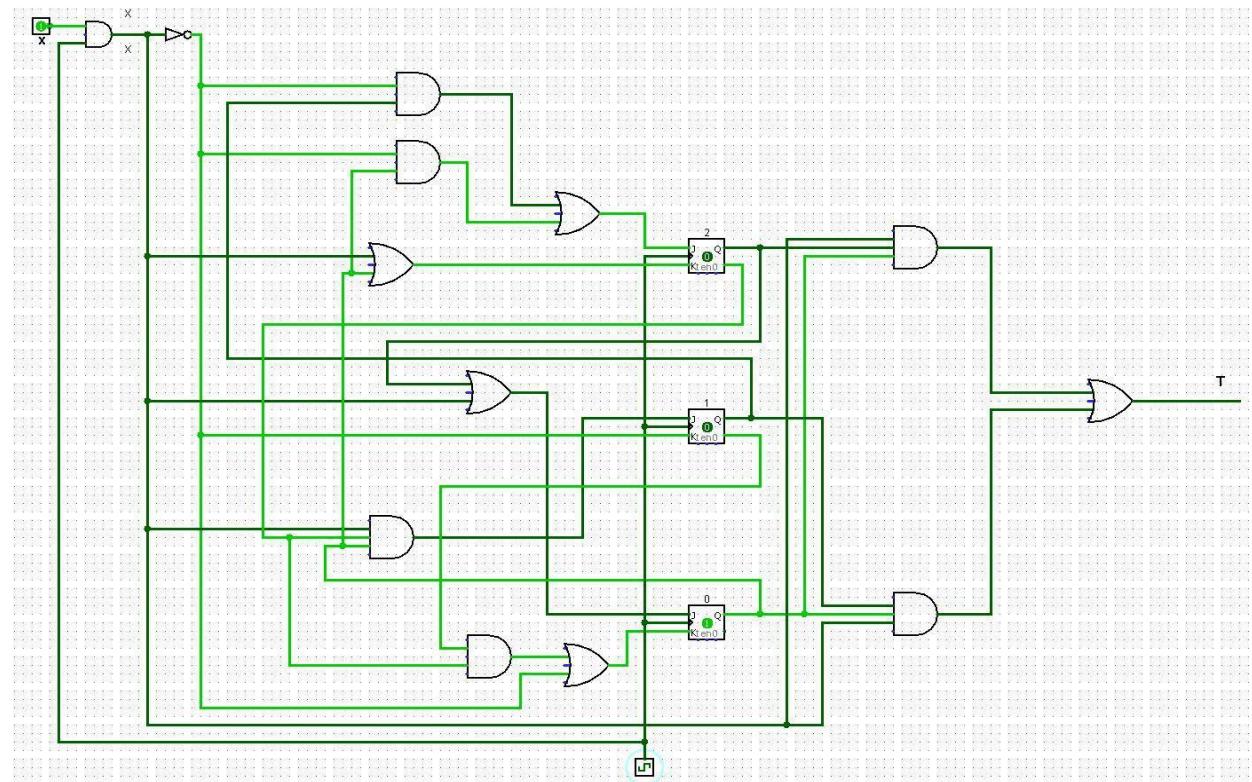
When 1 is entered at X when in State 5



14.101/1

State Change (5 to 0)

When 1 is entered at X when in State 5



4) LOGICISM CIRCUITS ILLUSTRATION

Original Circuit

