ECE111|Digital Circuits
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Lab_9:
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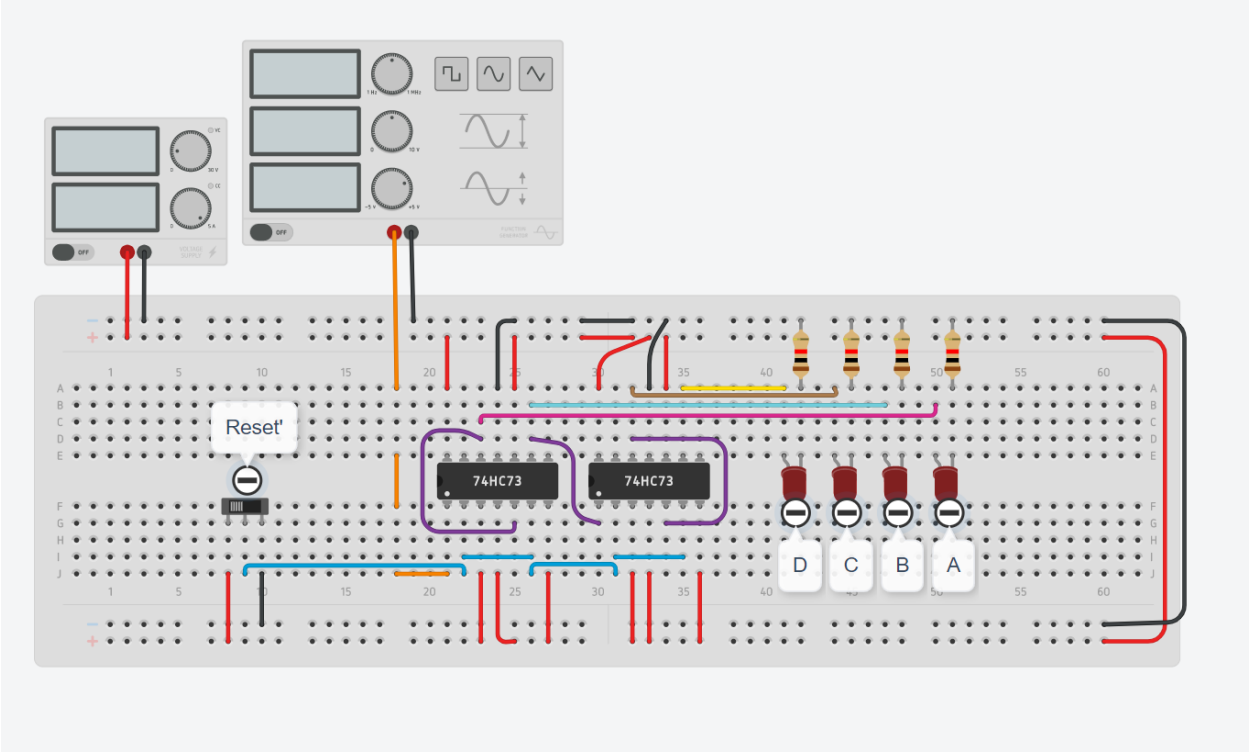
AIM 1 : Binary Ripple Counter

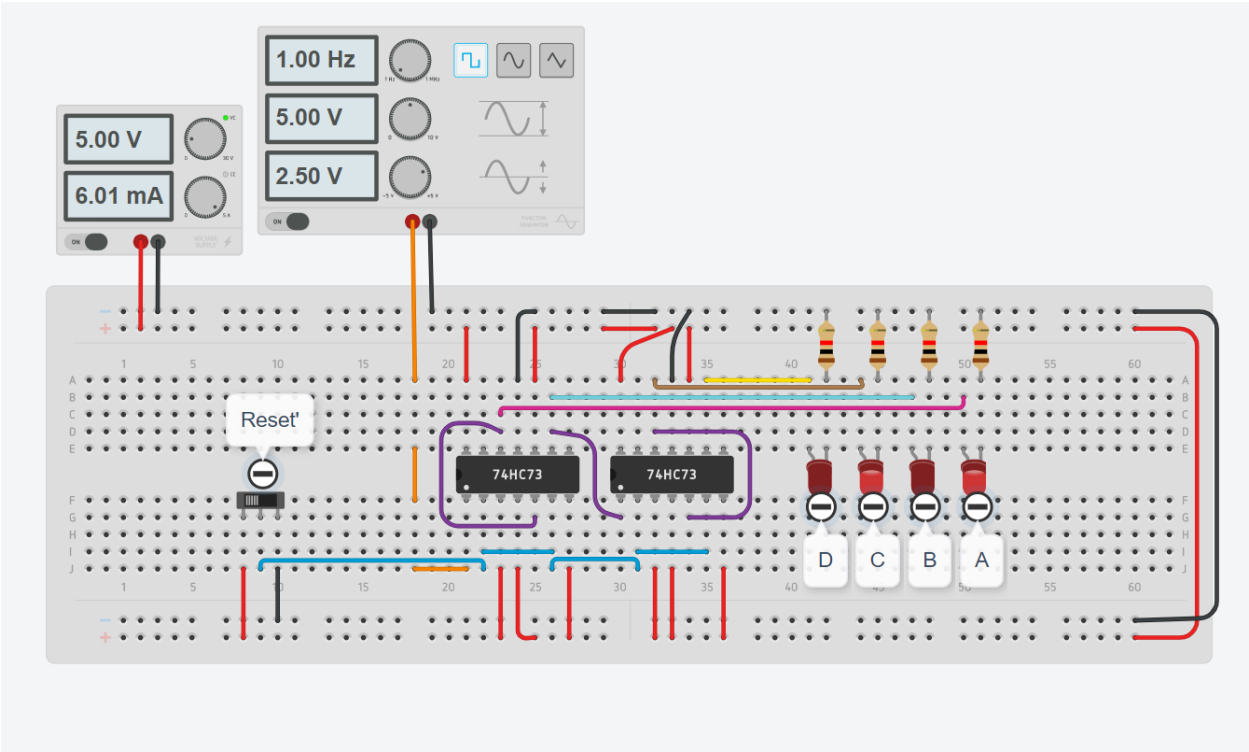
Components Used : 1 power supply , 4 resistors , 4 LEDs , 1 slide switches, 2 Dual J-K flip-flop(74HC73) , 1 Square Function Generator

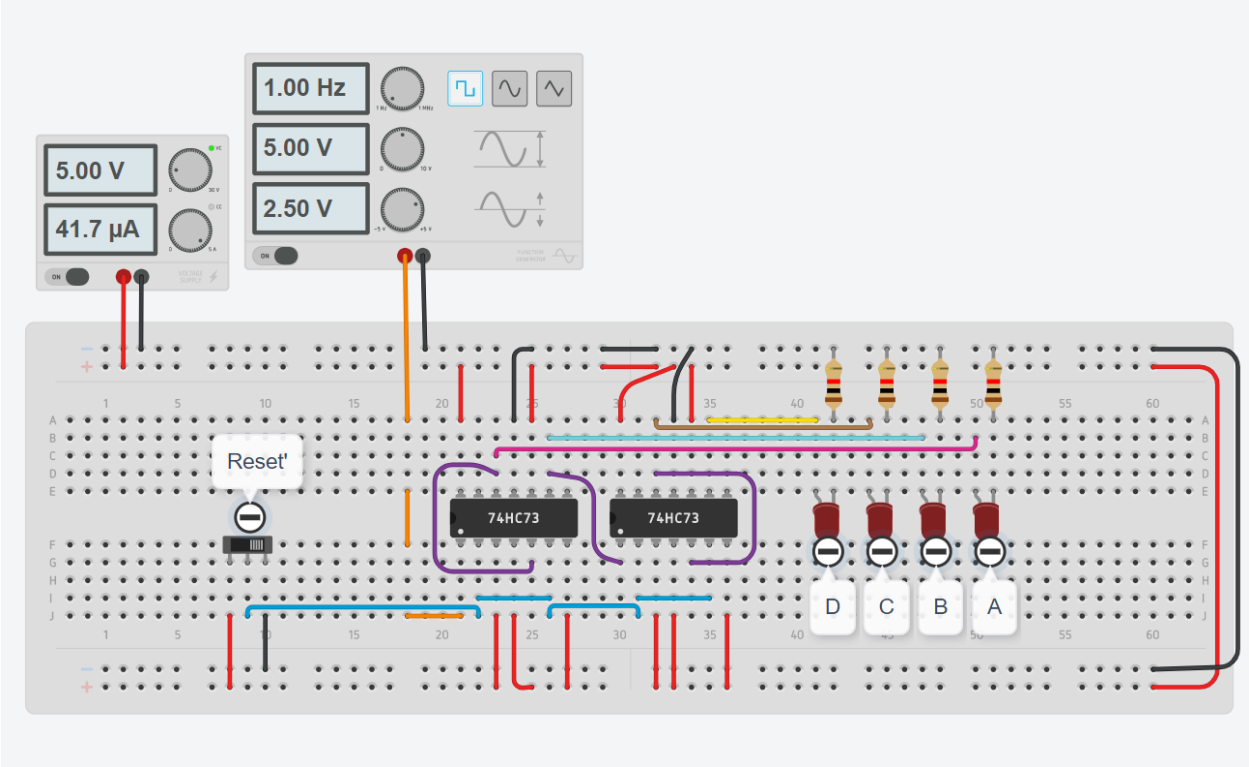
TinkerCad Link :

https://www.tinkercad.com/things/iqusvdx1kI1-binary-ripple-counter/editel?sharecode=4e25R62SlZ2niTLc6WE7ceWH84dmcCmMkqC6HgvD0YA

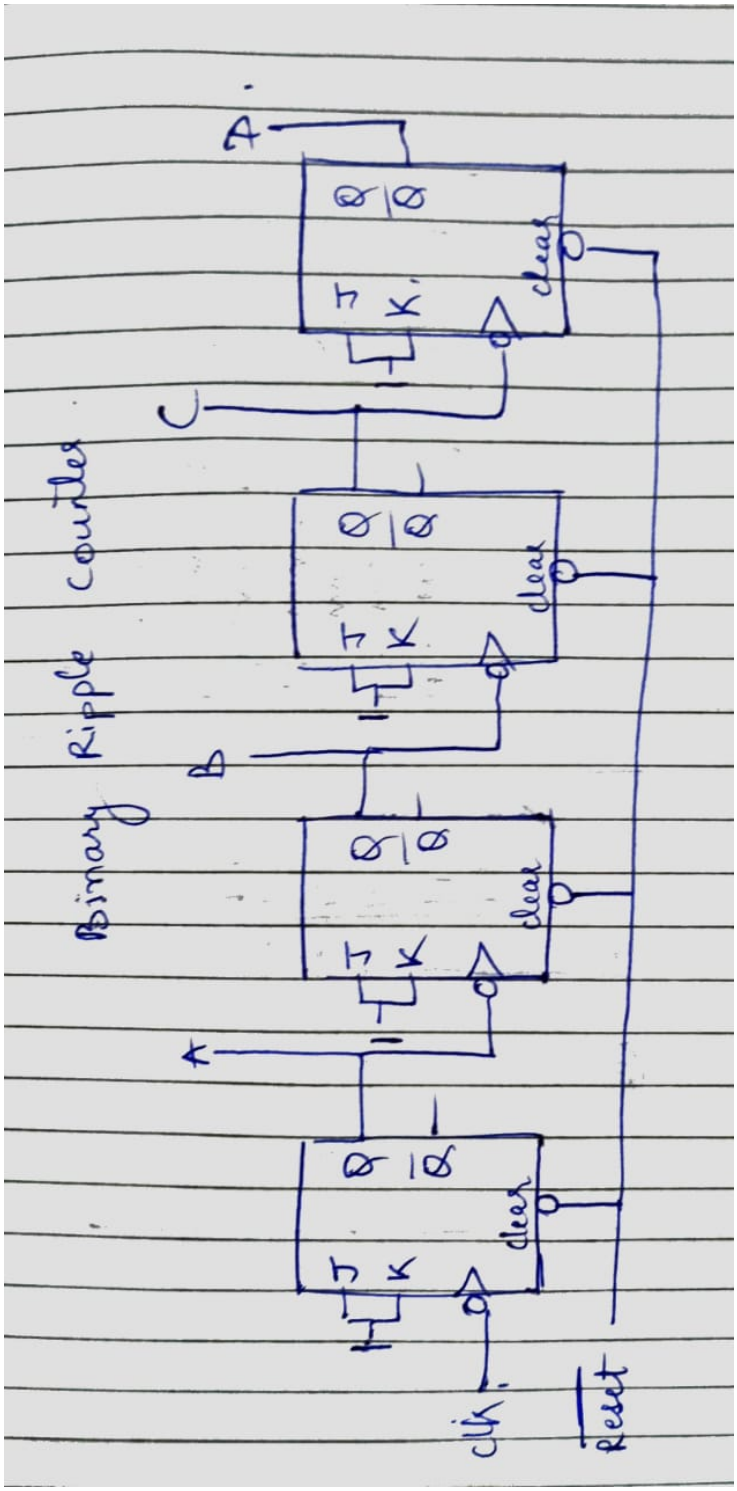
Screenshots :




1.00 Hz
5.00 V
2.50 V
5.00 V
6.01 mA
Reset'
74HC73
74HC73
D
C
B
A


1.00 Hz
5.00 V
2.50 V
5.00 V
41.7 µA
Reset'
74HC73
74HC73
D
C
B
A

Circuit Diagram :



Truth table :

Decimal	D	C	B	A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

Observations :

The circuit acts as a binary up counter and counts numbers from 0 to 15 using JK flip-flops. After counting upto 15 the counter goes back to 0 and starts counting again.
When the value of reset switch is given 0 then the value of the counter resets and counting starts again from 0.

Applications :

1. It can be used as frequency dividers with some changes
2. It can be used in time measurement for calculating time in timers.

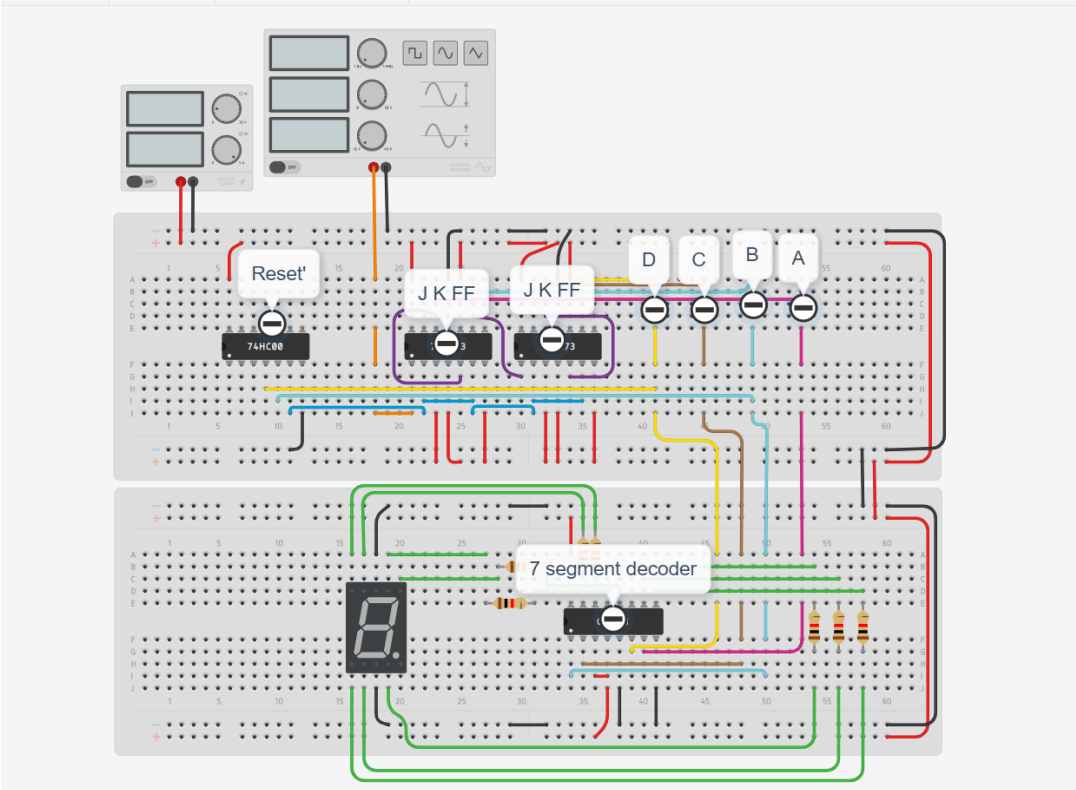
AIM 2 : Decade Ripple Counter

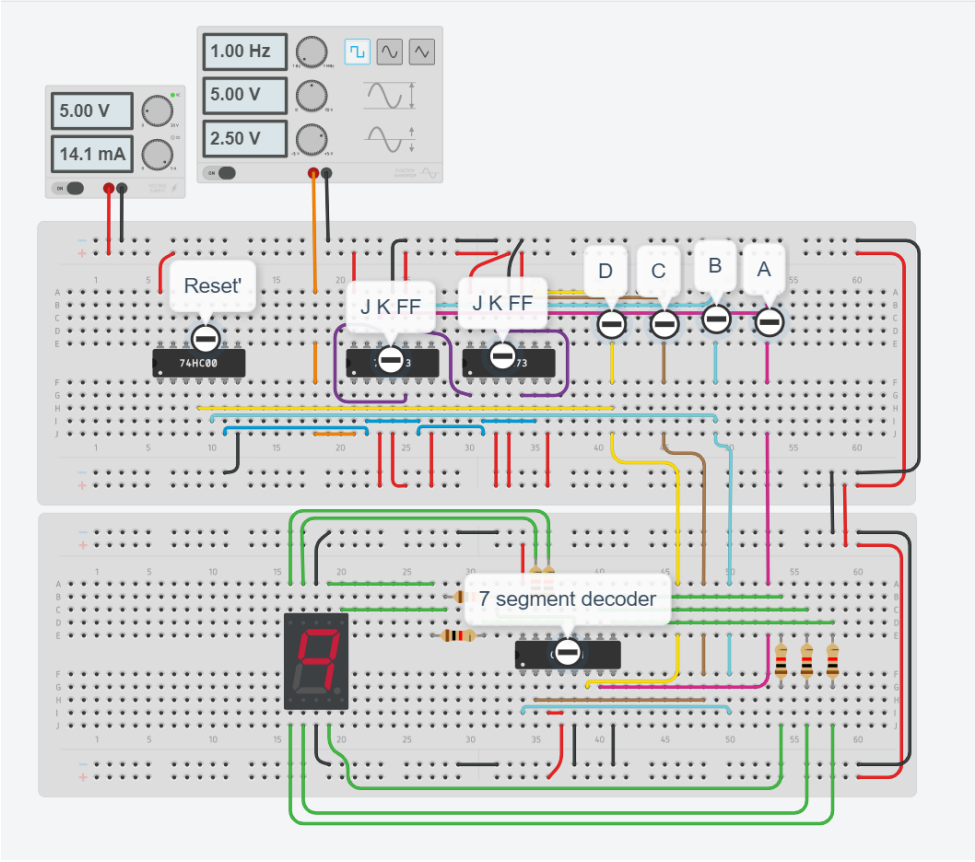
Components Used : 1 power supply , 7 resistors , 2 Dual D flip-flop(74HC74) , 1 Square Function Generator , 1 7-segment Decoder , 7 segment display ,1 Quad Nand Gate

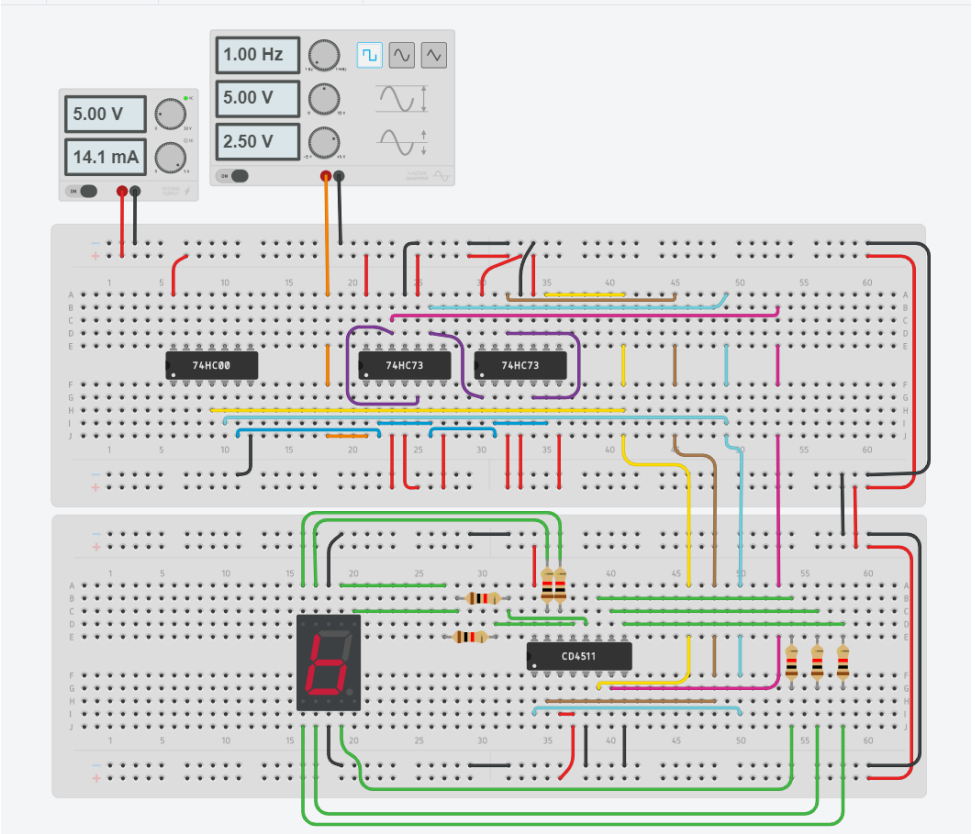
TinkerCad Link :

https://www.tinkercad.com/things/2UPyZJEbHPd-copy-of-binary-ripple-counter/editel?sharecode=gAeUemVqyhIjIKwrrQ3n2bp-ay0tjHe5U-BM6PJzk5c

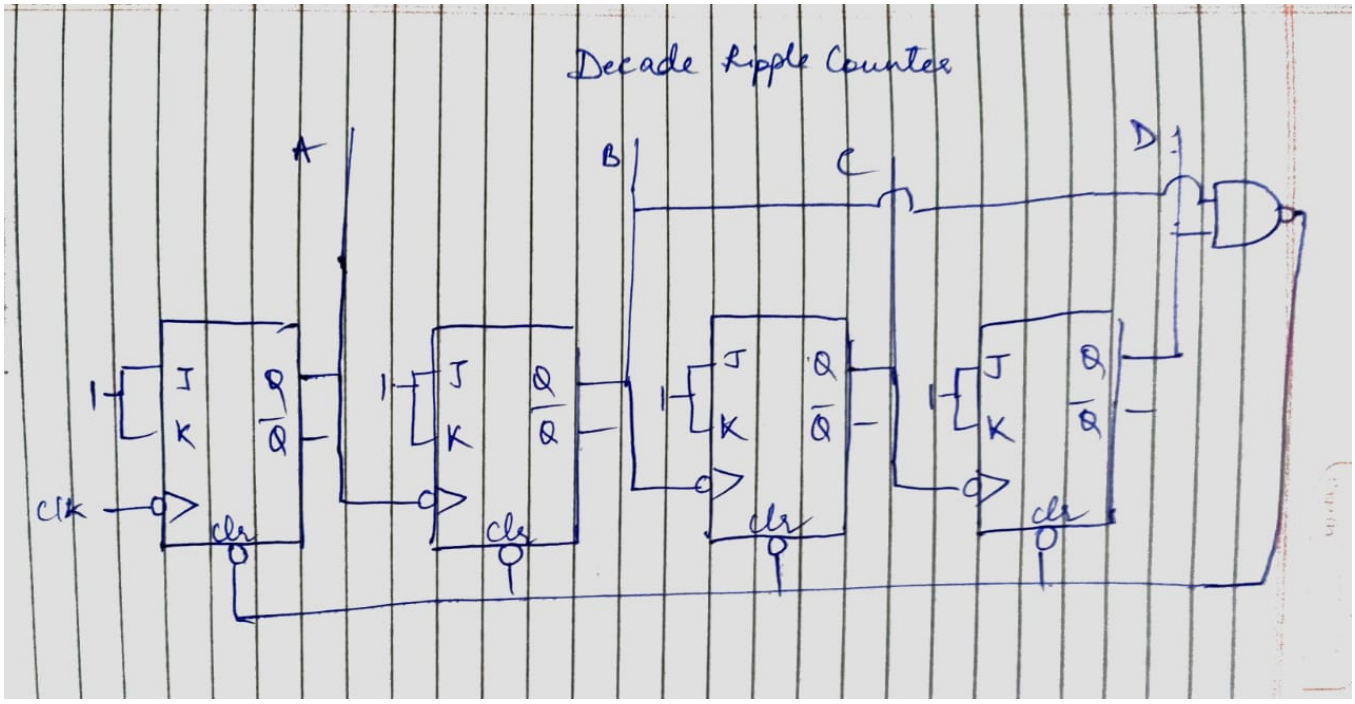
Screenshots :

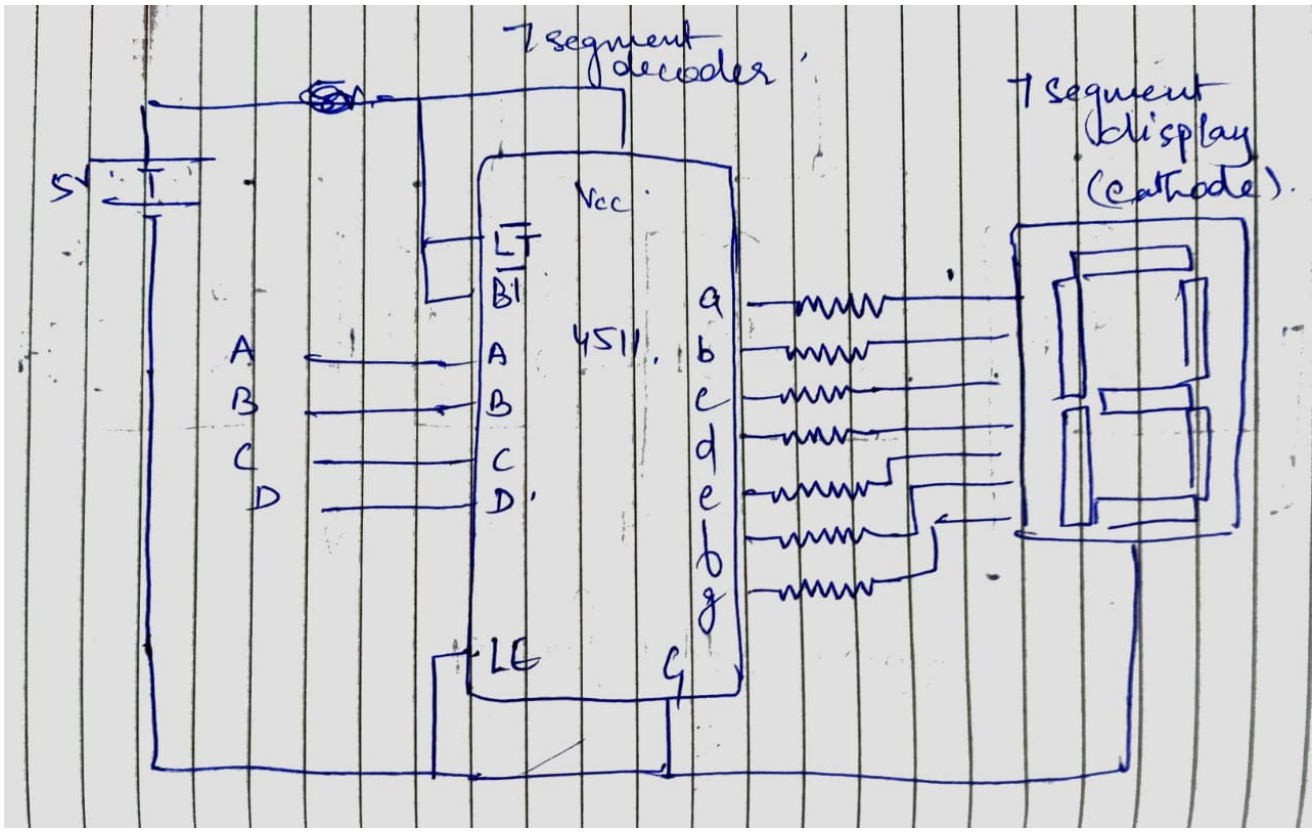



1.00 Hz
5.00 V
2.50 V
5.00 V
14.1 mA
Reset'
J K FF
J K FF
D
C
B
A
74HC00
7 segment decoder


1.00 Hz
5.00 V
2.50 V
5.00 V
14.1 mA
74HC00
74HC73
74HC73
CD4511

Circuit Diagram:





Truth Table :

Output	D	C	B	A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
0	0	0	0	0
...	...	...	...	...

Observations :

The Decade ripple counter acts as a binary up counter and counts numbers from 0 to 9 using JK flip-flops. After counting upto 9 the counter goes back to 0 and starts counting again.
When the output of the flip flops becomes 10 or 1010(DCBA) then the value of the reset switch becomes 0 and the counter restarts from 0

Applications :

1. They are used in clock circuits for time measurement.
2. They are used in frequency dividers.