Name of the participant: Sowmya Bodduboina

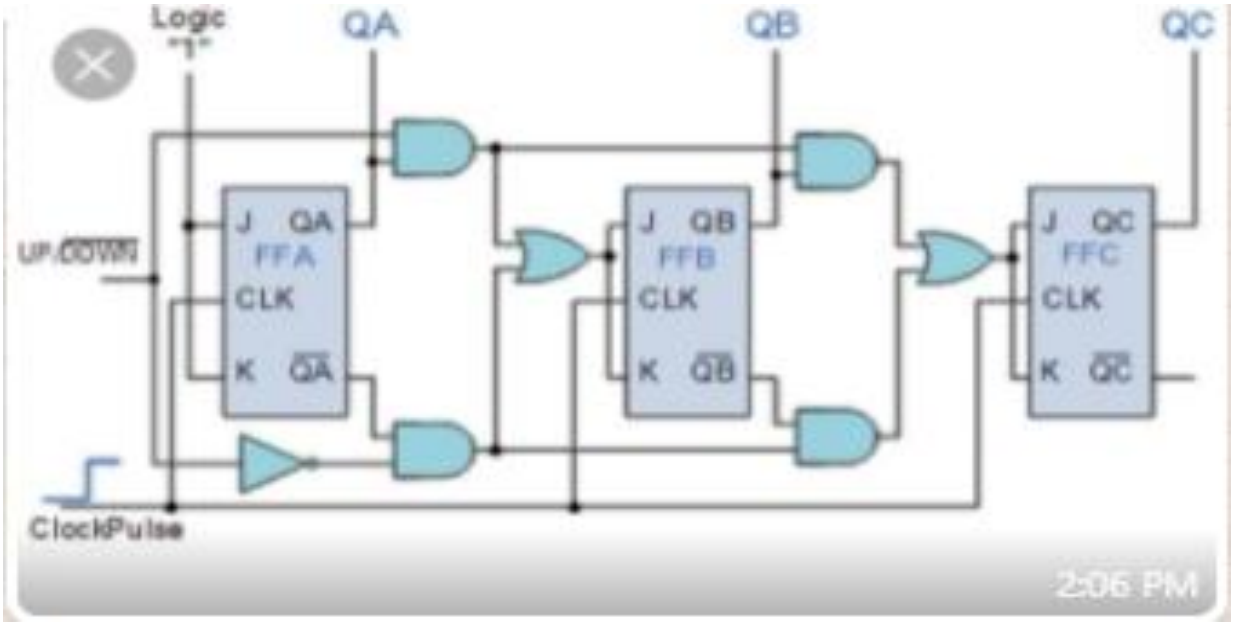
Tittle of the circuit: 3 bit Bidirectional Up/Down binary counter

Theory: The circuit is of a simple 3-bit Up/Down synchronous counter using JK flip-flops configured to operate as toggle or T-type flip-flops giving a maximum count of zero (000) to seven (111) and back to zero again. Then the 3-Bit counter advances upward in sequence (0,1,2,3,4,5,6,7) or downwards in reverse sequence (7,6,5,4,3,2,1,0).

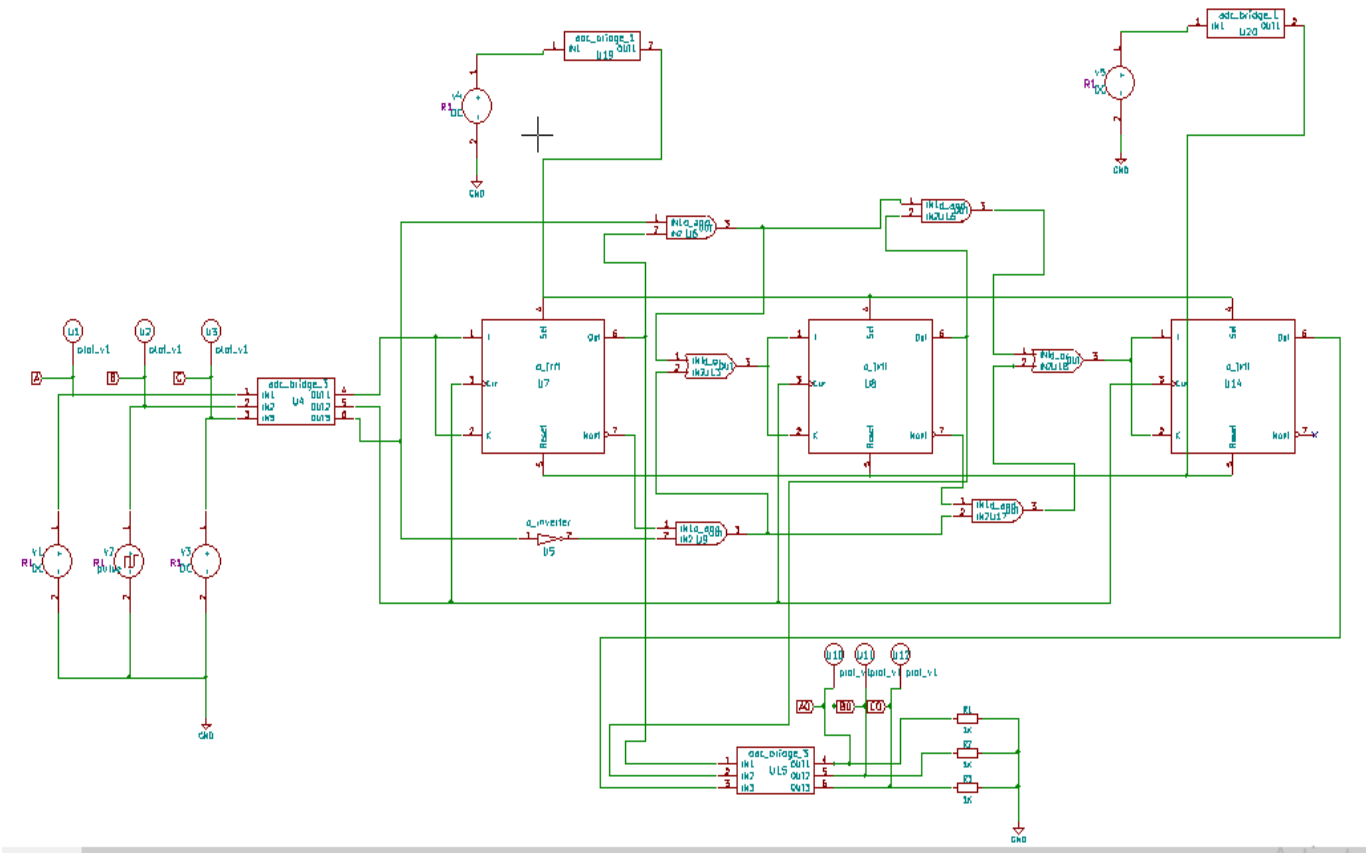
Generally most bidirectional counter chips can be made to change their count direction either up or down at any point within their counting sequence. This is achieved by using an additional input pin which determines the direction of the count, either Up or Down and the timing diagram gives an example of the counters operation as this Up/Down input changes state.

Nowadays, both up and down counters are incorporated into single IC that is fully programmable to count in both an “Up” and a “Down” direction from any preset value producing a complete Bidirectional Counter chip.

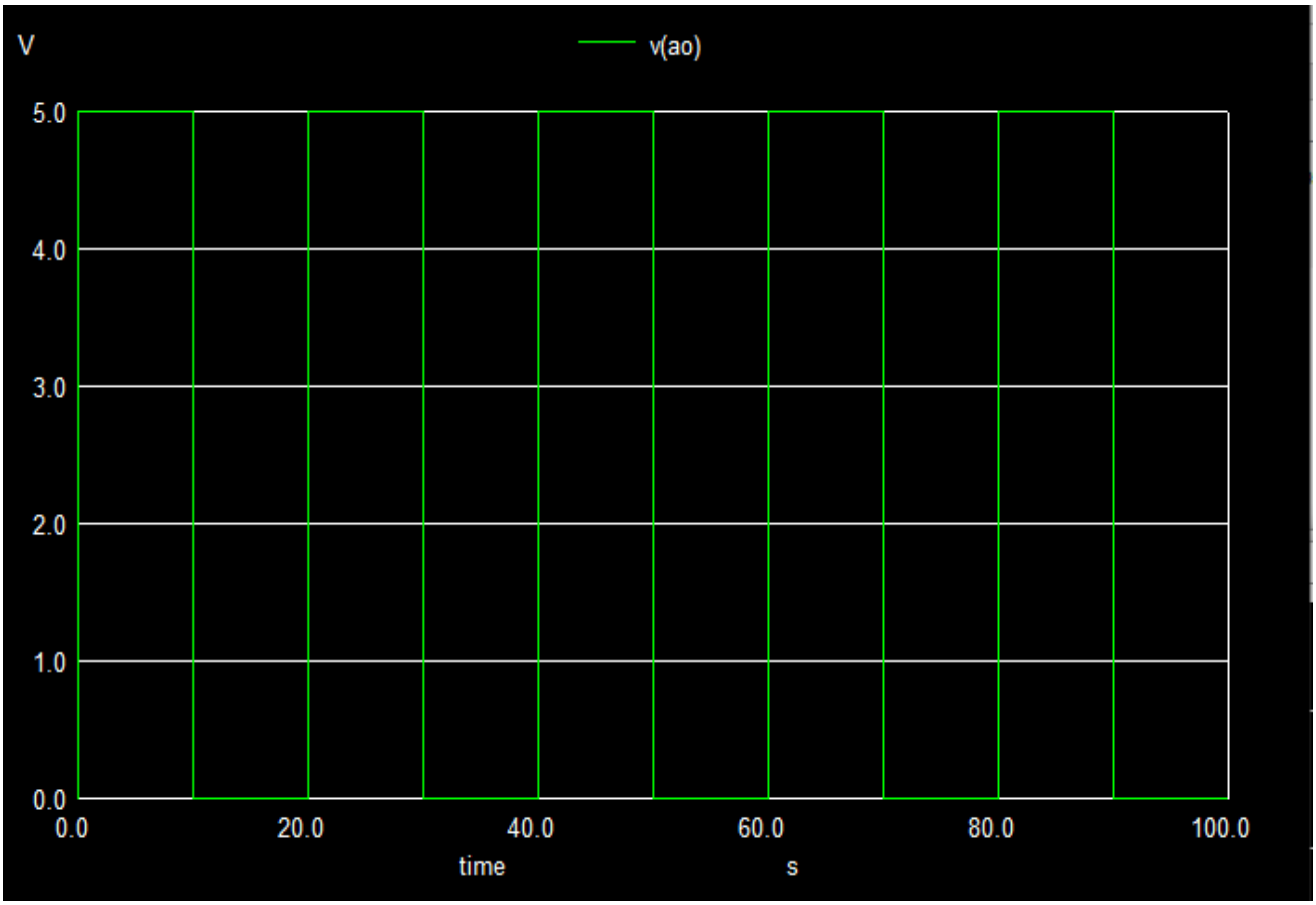
Circuit Diagram:

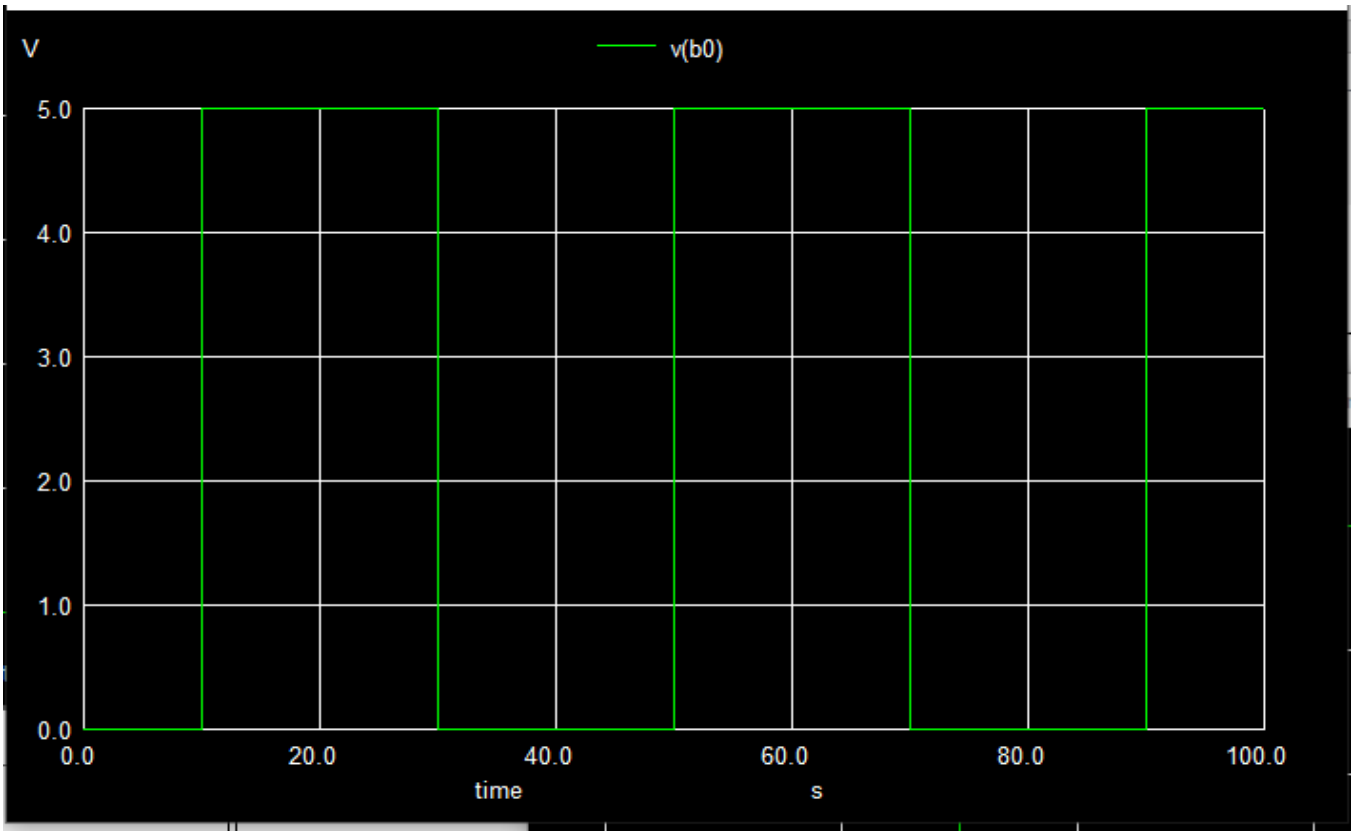


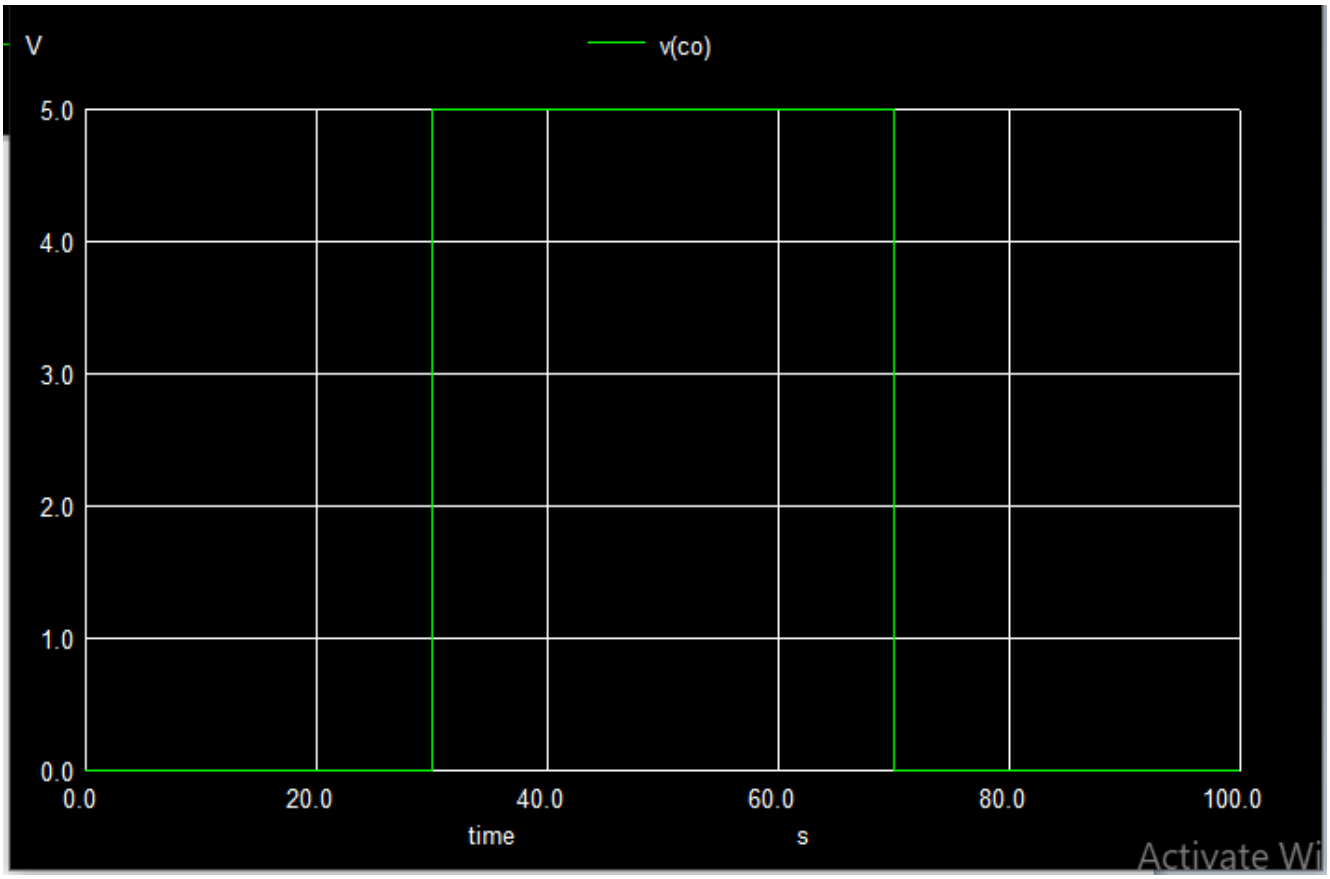
schematic:



Ngspice Plots:


V
v(ao)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
s


V
v(b0)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
s



Reference:

https://www.electronics-tutorials.ws/counter/count_4.html