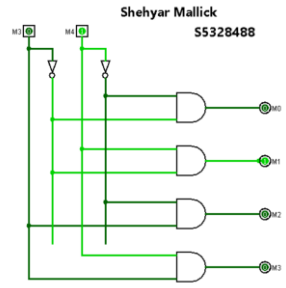
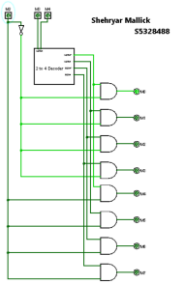
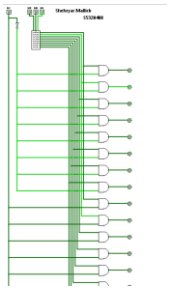
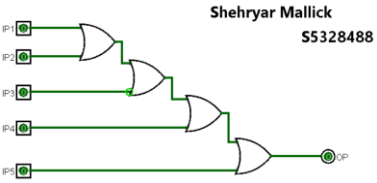
We need to have a 4 to 16 decoder which we made from a 3 to 8 decoder which was made from a 2 to 4 decoder.

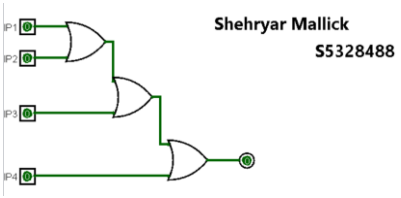




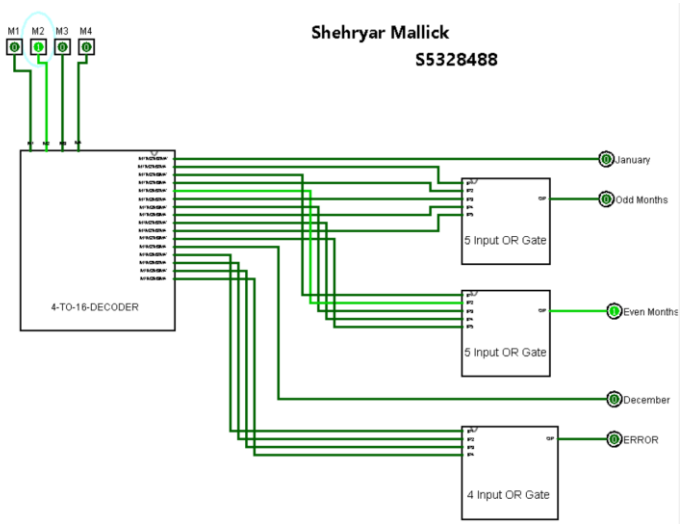


5 IP and a 4 IP OR

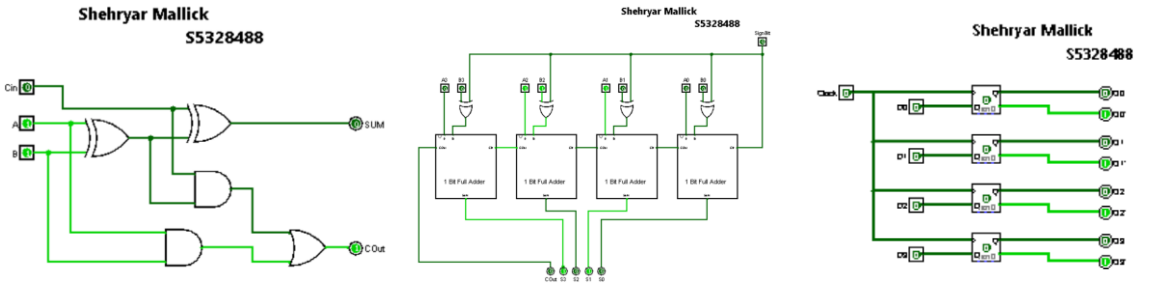




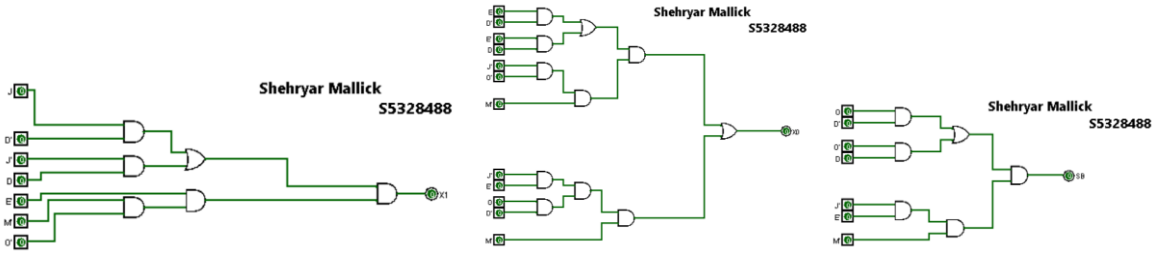
This is the part A of our circuit where we have used the 4 to 16 decoder sub-circuit and the 2 OR gates. So, if the input is 0000 it represents January, the signal goes directly to the output. If the input is even number and < 12, it goes into the 5 input OR we created and then send the output signal. Similarly, if the input is odd and less than 11 it goes into the 5 input OR gate, while if the input is greater than or equal to 12 it goes into the 4 input OR gate which represents the Error signal. Finally, if the input is 11 it goes directly to December output.



Now we will use this in the part B as a subcircuit. We made a 1bit adder and made 4bit adder subtractor moreover we made 4bit D flip flop.



Once done we solved the equations for X0, X1 and the sign bit and will use them as sub-circuit.



Finally we will connect all these sub-circuits and the part A sub-circuit together. The outputs of PartA will go into the X0,X1 and +/- logic, which would then be pushed into the second number of the adder, while we fix the last 2MSB of second number using constants. The output of the adder is pushed to the flip-flop and the output of the flip-flop is pushed to the LEDs to display the stock and at the same time they are looped back into the first number of the Adder. We have used a button to regulate the clock on the flip-flop.