

OBJECTIVE:

Implement and simulate (in Circuit Maker software) a BCD (binary-coded decimal) adder that adds two single-digit BCD numbers BD1 and BD2 with proper correction.

Name: Harshavardhan Alimi

Roll no: 18EC10021

Problem statement:

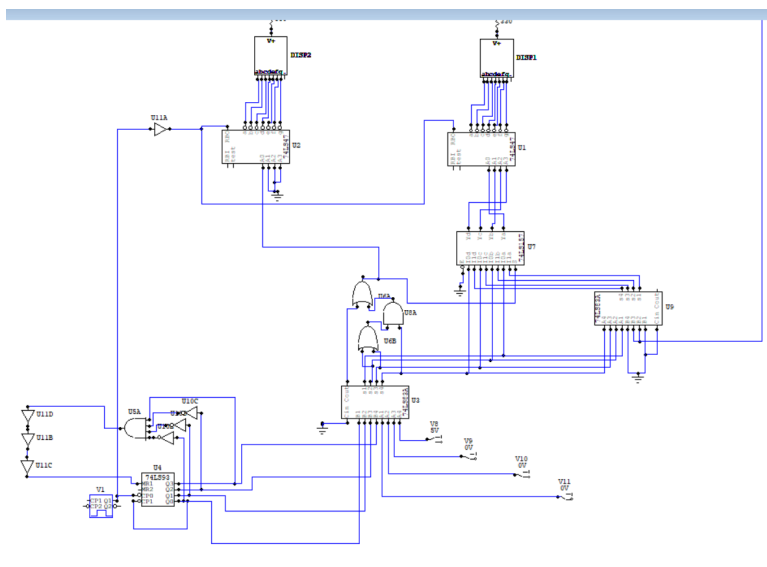
p=1;

$$BD1 = 9 - 1 = 8;$$

MC=8;

BD2= [0:8]

Circuit diagram:



Discussion:

- As my BD1=8 and MC=8.sum ranges from 08 to 16
- For addition,we just directly give the 4bit input of A and B to IC-7438 which will be the addition.

- To restrict, the clk only upto 8, we have to do a reset of the clk whenever we reach 8, so we have to connect $Q_3Q_2'Q_1'Q_0'$ to Master reset.
- Displaying the numbers in 7-segment display:
 - We have to display only the BCD input for the 7-segment display. i.e, 0 to 9 only.
 - To determine whether the output of adder is greater than 9 or not.
 - We use the boolean expression $C_{out} + S_4.(S_3 + S_2)$, this expression gives a high level when the adder output is greater than 9.
 - So we come across two cases where the output of the adder is less than 9 or greater than 9.
 - If the number is less than 9 we just simply give that output from adder to IC-7447 as input.
 - If the number is greater than 9 we add 6 to the output of the adder using another IC-7483 (adder), the output from this adder is fed as input to IC-7447.
 - The nibble multiplexer (IC-74157) is used to determine whether which of the two above outputs to be feed as input for the IC-7447, the select of nibble will be high when the adder output is greater than 9. so, this nibble acts as a between the two process mentioned.
- At last we feed the 4-bit output which comes from the nibble multiplexer (IC-74157) as input for the IC-7447, this takes care of which digit to be displayed at units place.
- For deciding the digit at ten's place we use the previous boolean expression.