Digital Electronics Circuits lab
Lab Experiment:5

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<u>AIM</u>:To add or subtract the two given numbers.
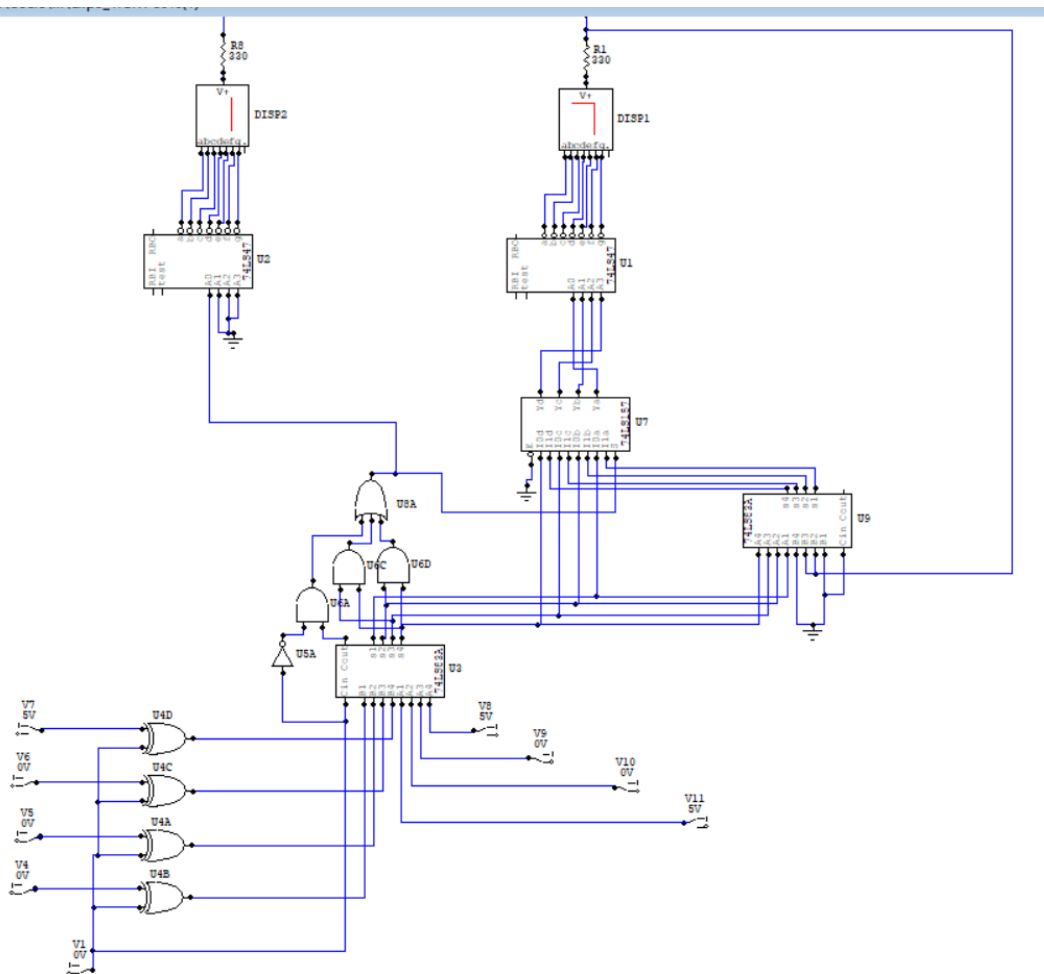
ICs used:-

74LS83-2 quantity

74LS157-1 quantity

74LS47-2 quantity

Components used:- 7-seg display, Logic Gates

<u>Circuit</u>:Digital circuit for displaying the addition and subtraction output of two numbers.

Discussion:-
Task.1:
Implementing the addition and subtraction-
- ● For addition
  - ○ we just directly give the 4bit input of A and B to IC-7438 which will be the addition.
- ● For subtraction
  - ○ We complement the B using the XOR gates at each bit and this will be feed as one of the 4bit input for the adder
  - ○ The adder adds the two numbers and gives a carry but our output of subtraction should not be of 5bit so we make the carry to be zero when we do subtraction.

Task.2:
- ● 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.