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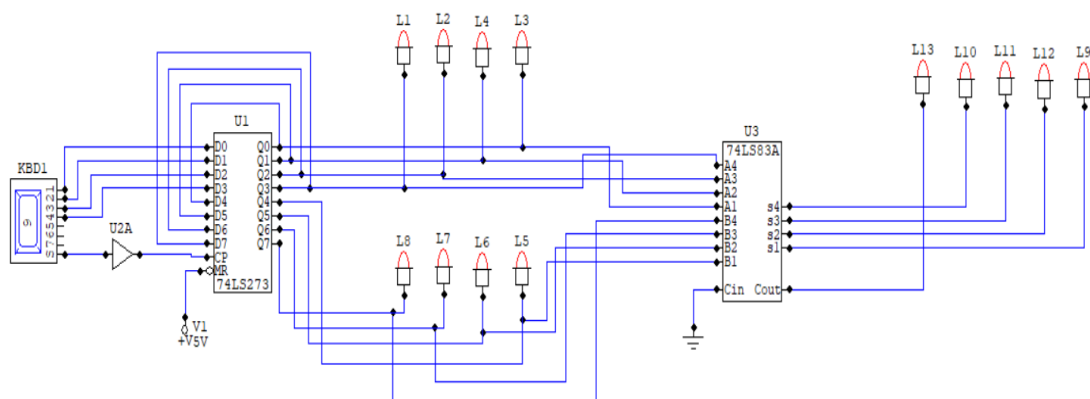
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DIGITAL LABORATORY EXPERIMENT 4

AIM:

To add two 4-bit numbers input from ASCII key and display the sum output (5bits) on logic displays.

CIRCUIT DIAGRAM



The devices required for this experimental setup are a ASCII keyboard, CD 5040(non-inverting buffer), Logic displays, 74LS273(Octal positive edge-triggered D-type Flip Flop with reset), Power Supplies and IC 7483(4-bit Binary Full Adder).

BREIF THEORY AND EXPLANATION

This experiment is basically another variant of the last experiment, where we take the input from an ASCII keyboard, which is easier compared the last experiment, and the way the numbers get added is different where we use a full adder instead of a 1-bit adder. So, the first device is an ASCII keyboard, which is pretty straight-forward considering the fact that the input is simply taken from our keyboard. We have 8 pins out of which one is S pin, which is used as a Strobe signal output, which we connect to a non-inverting buffer to delay the signal and not invert it in the process of doing so, and connect it to the CP pin of 74LS273. Other pins are used as binary input pins which are connected to IC 74LS273. We connect pin 1,2,3,4 of ASCII keyboard to pin D0-3 of IC 74LS273. As we need to give two inputs, the addend and augend. The way to achieve this, we connect the D4-7 pins to Q0-3 pins of the same device, which allows to take the second number from keyboard with the help of another strobe signal. By this, the first number's binary data is stored on pin Q4-7 and data of second number is stored in pin Q0-3.

We connect these pins to A0-3 and B0-3 pins of our full adder, which is a 4-bit adder, which adds the number on its own and gives the output. Other pins we are considered about are Cin and Cout of the full adder, in here we only use a single adder so we just ground the Cin pin, where Cout gives the 5th bit value of the output. Another connection which we have is MR pin must to connected to 5V power supply. We do this because we don't need to the master reset pin's functionality in this experiment.

SNAPSHOTS OF THE SIMULATION:

To show the results of the simulations, I have taken 12 examples of binary additions. All the images are in the order given below,

Example01: $1011 + 1110 = 11001$

Example02: $1001 + 1101 = 10110$

Example03: $1010 + 1110 = 11000$

Example04: $1000 + 1100 = 10100$

Example05: $0001 + 1001 = 01010$

Example06: $1010 + 0101 = 01111$

Example07: $1111 + 1111 = 11110$

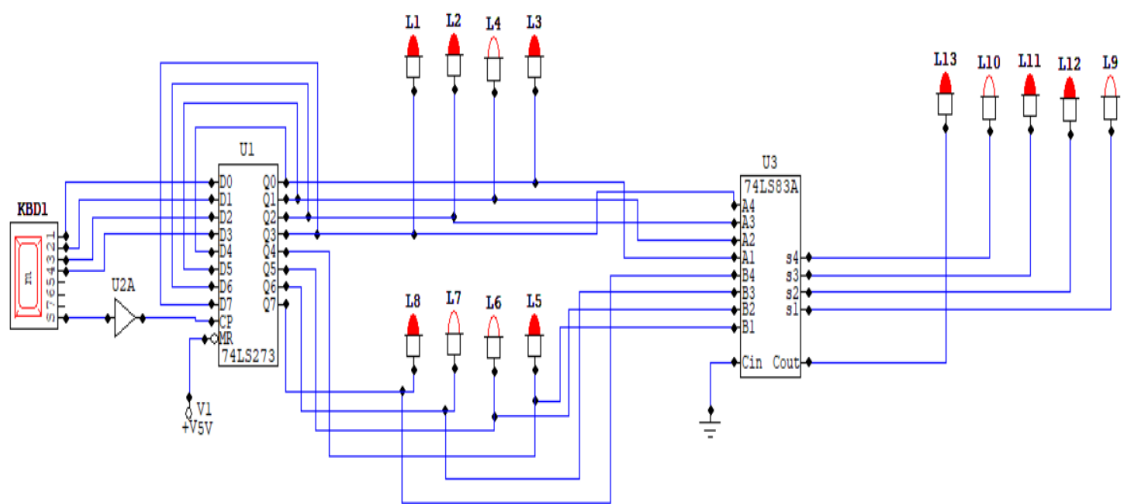
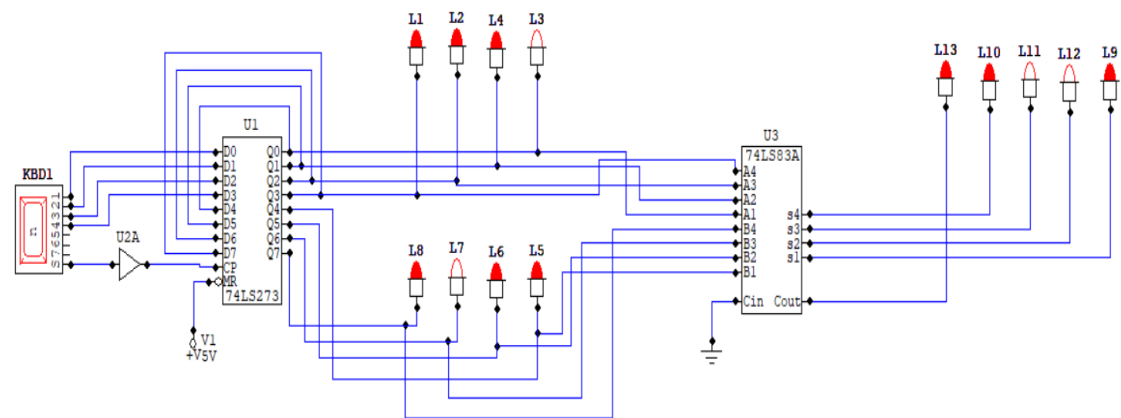
Example08: $0111 + 1100 = 10011$

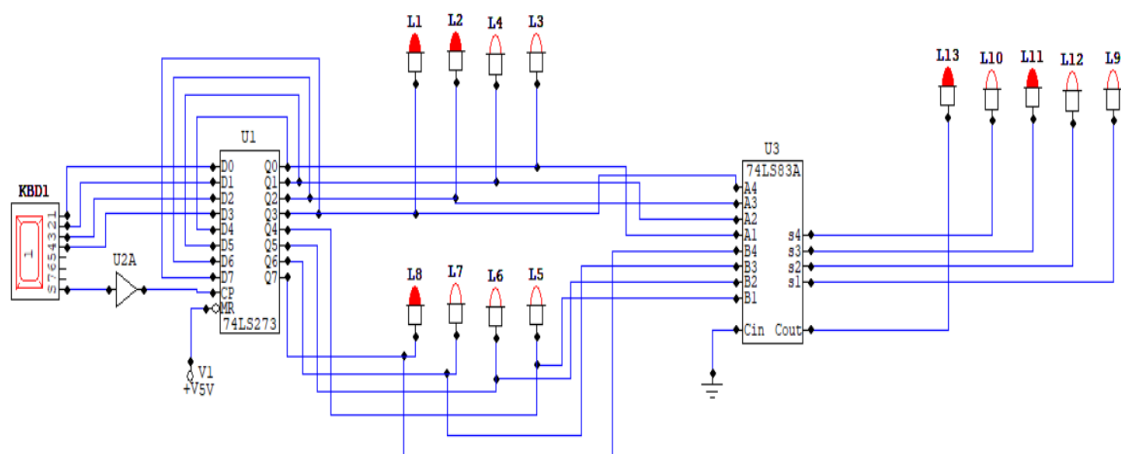
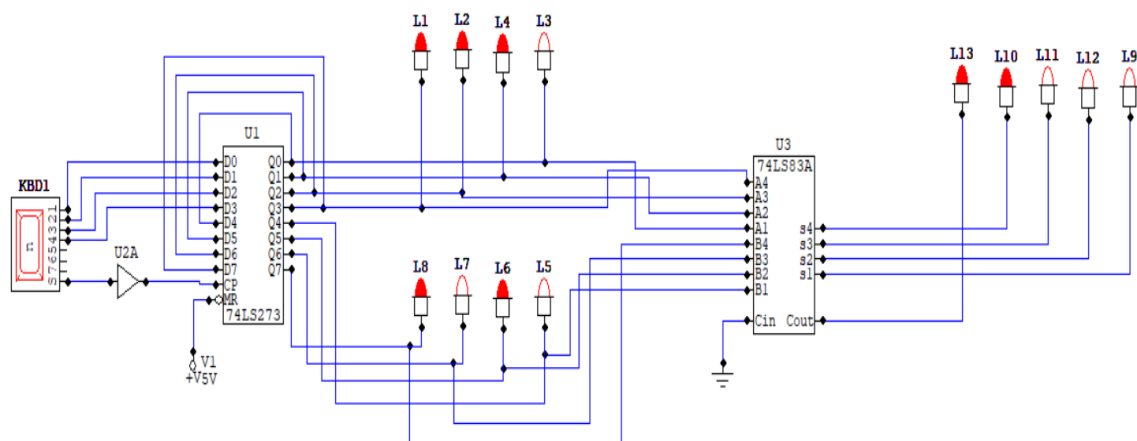
Example09: $0001 + 0001 = 00010$

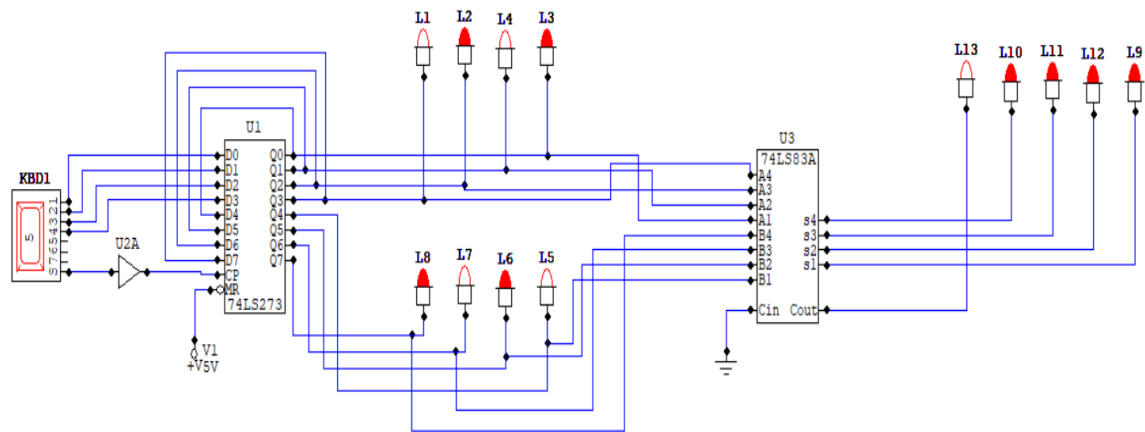
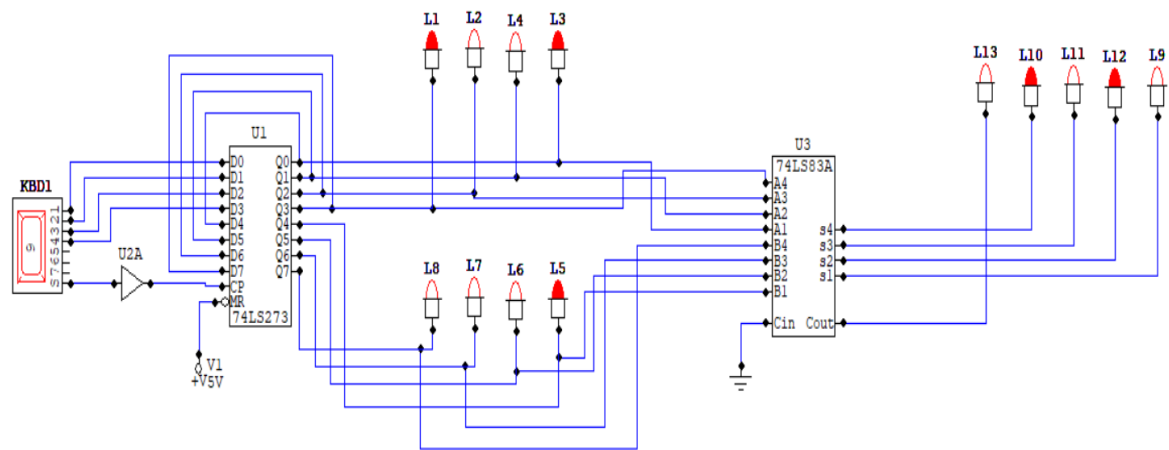
Example10: $0011 + 0010 = 00101$

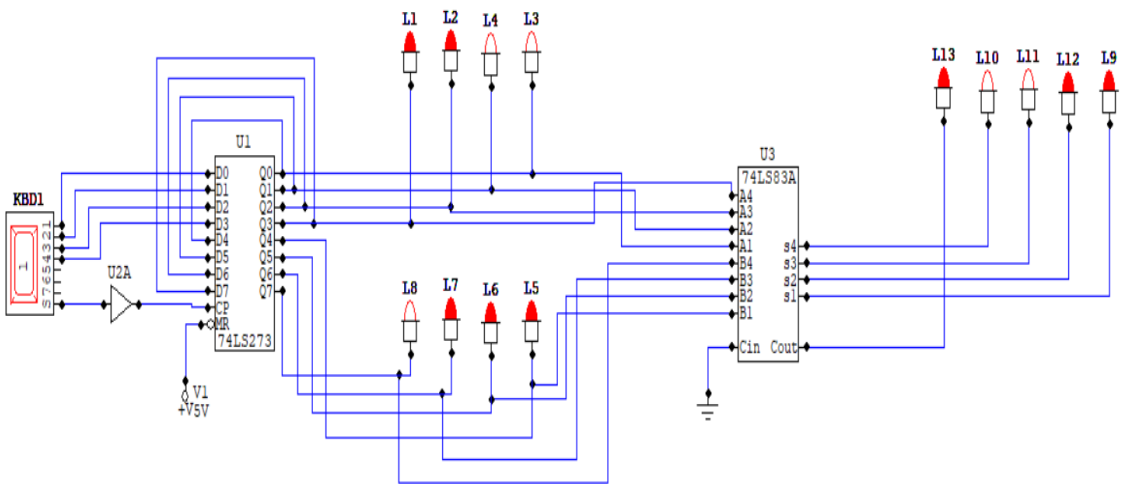
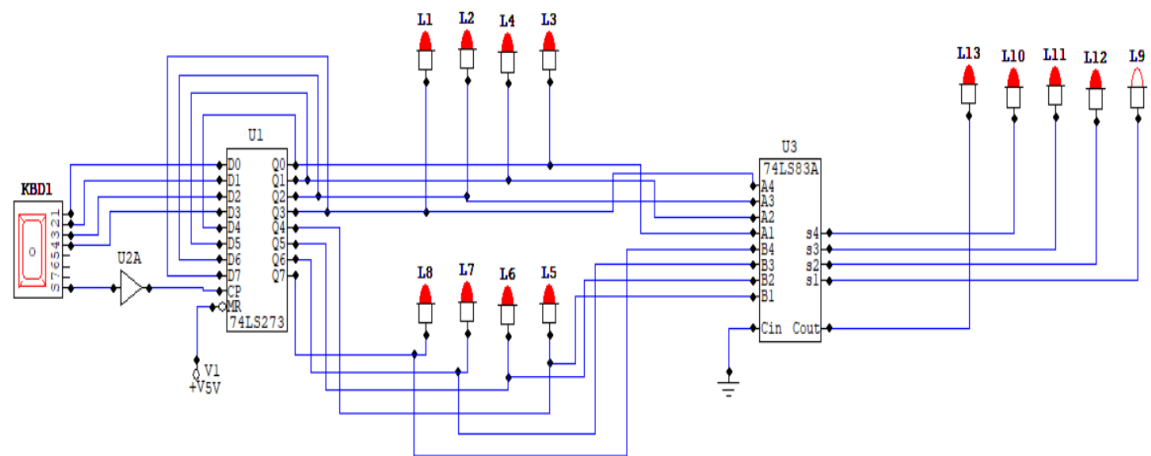
Example11: $0101 + 0100 = 01001$

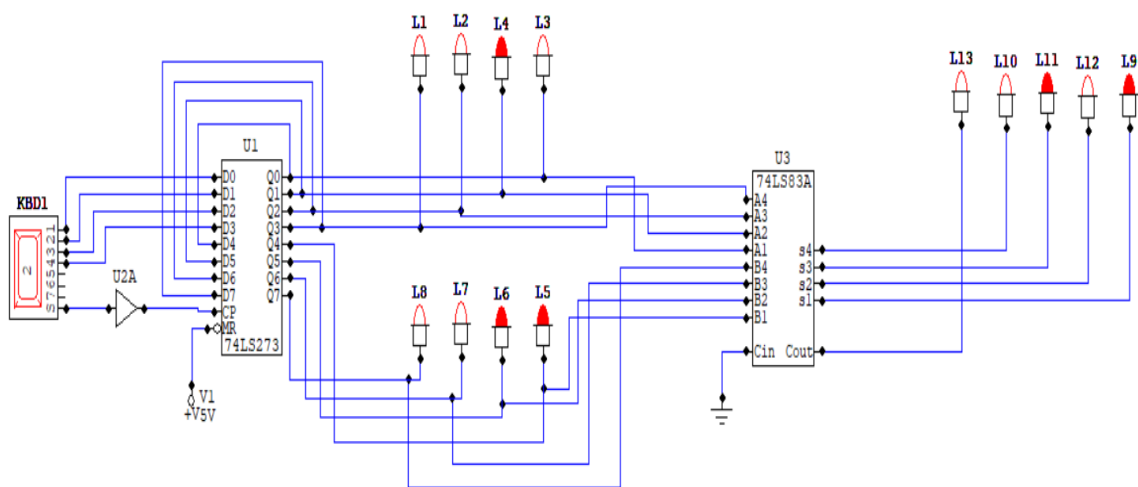
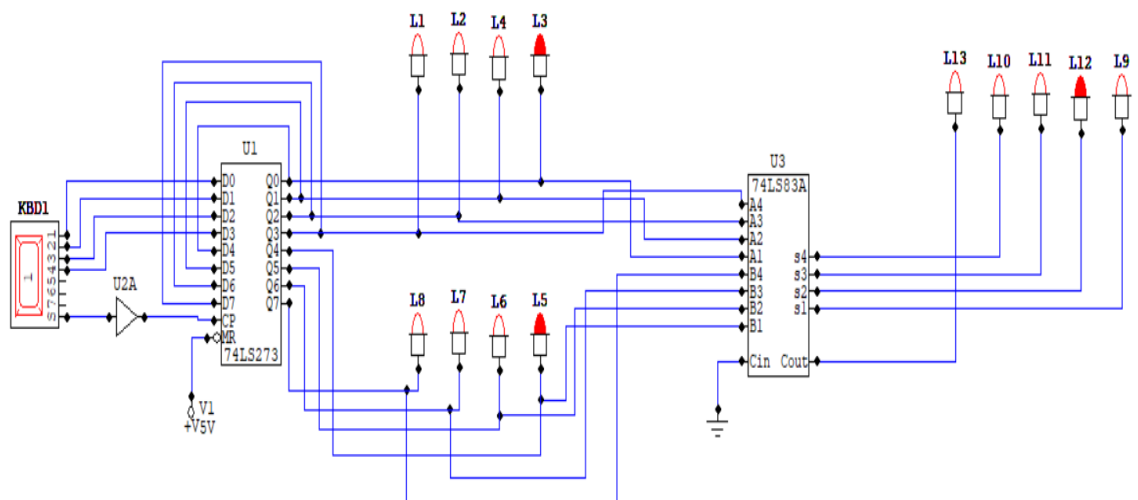
Example12: $0111 + 0111 = 01110$

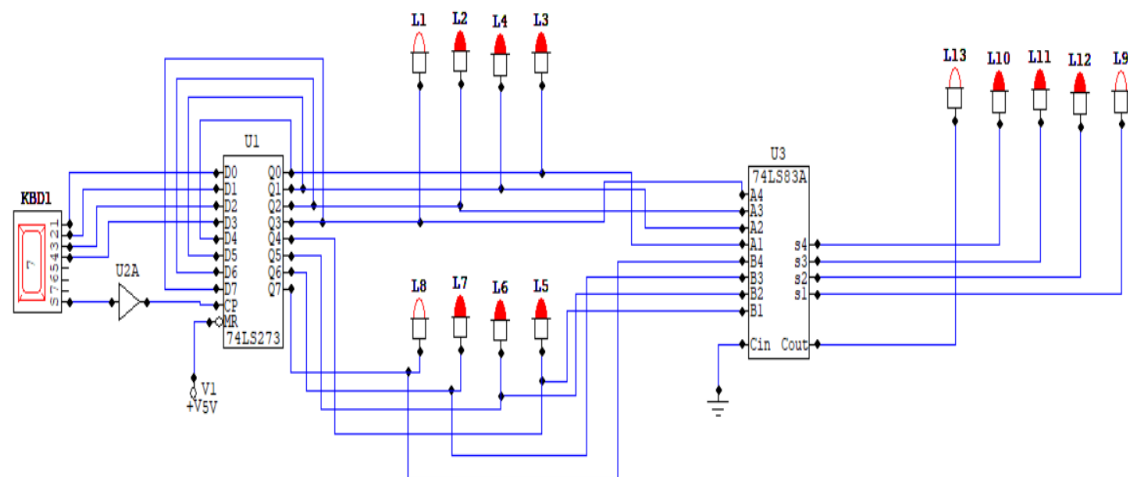
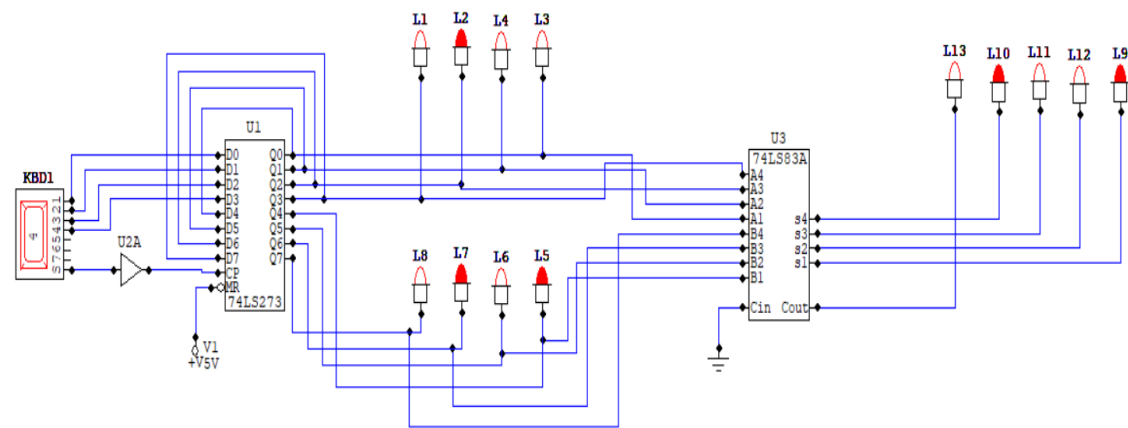












OBSERVATION AND CONCLUSION

From the observations we see the working of the our 4-bit adder model. I will add the .ckt file along the report. This brings us to the end of this experiment.