NAME: Kundrapu N R Sai Akash

ROLL NO.: 20EC10043

DIGITAL LABORATORY EXPERIMENT 1

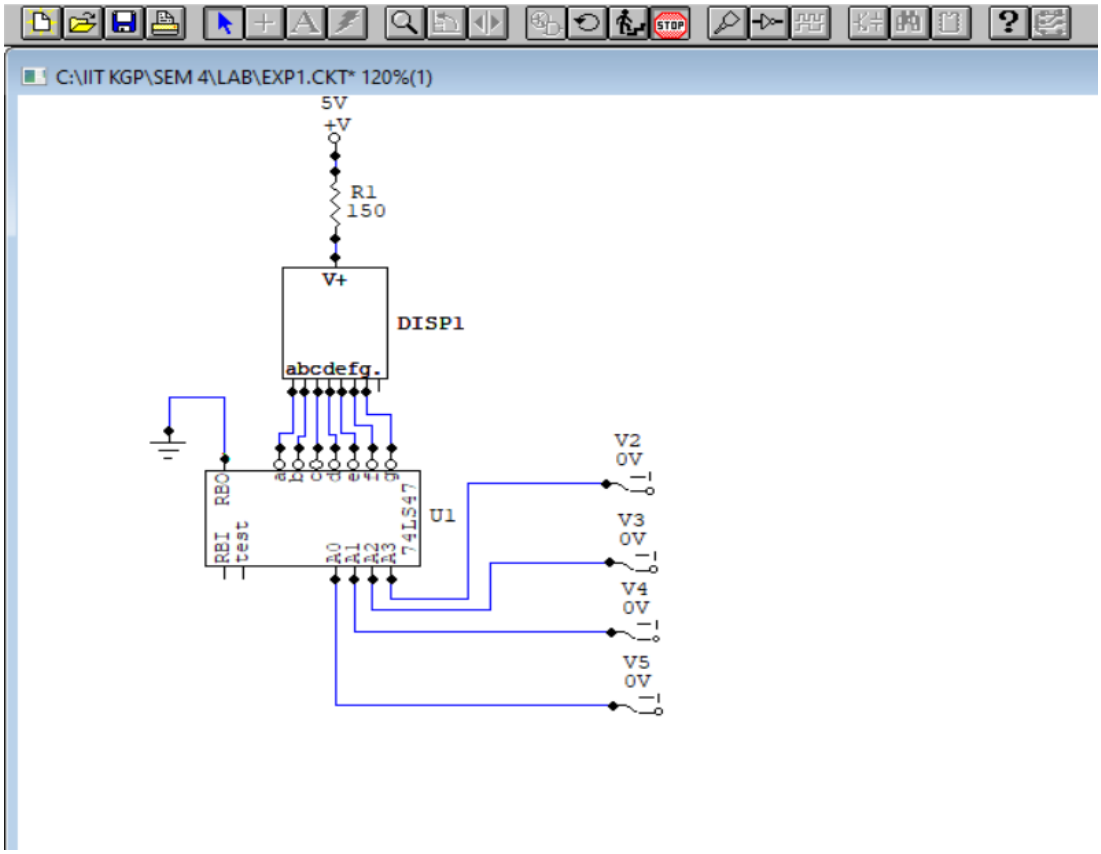
AIM:

Familiarization with IC 7447, where we have to verify few of the functionalities of the IC.

Part1.

When a low logic level is applied to BI/ RBO (blanking input), all segment outputs are OFF regardless of the level of any other input.

We can connect any pin to LOW logic by grounding the terminal, Circuit diagram of verifying this part is given below,

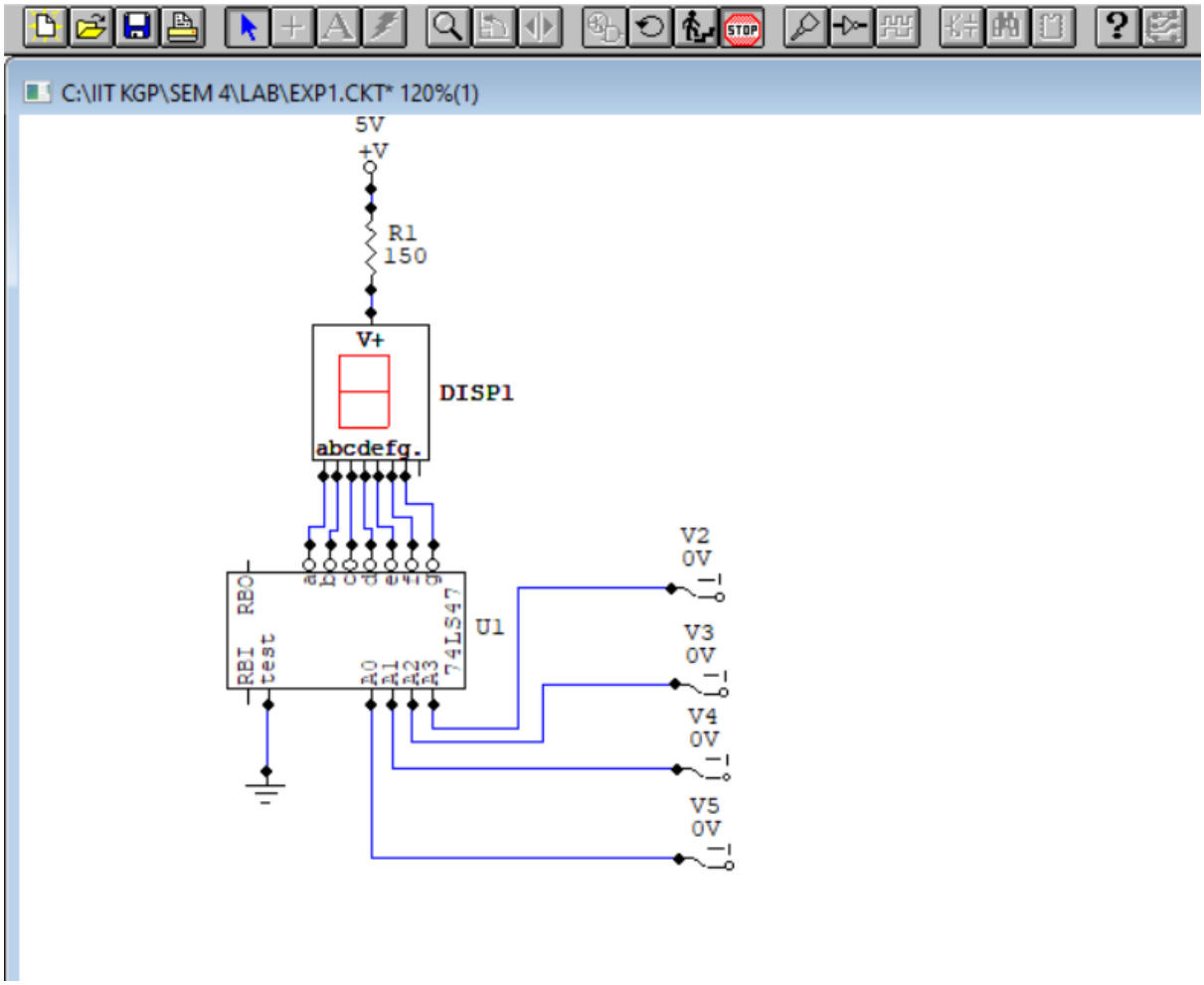


As we can see, all the segments are OFF when 0000 logic is fed to the display.

Part2.

When BI / RBO is open or held HIGH and a low level with LT (lamp test) input, all segment outputs are ON.

This can be achieved by grounding the LT pin, and keep the other pins floating (regarded as HIGH), circuit diagram is given below,

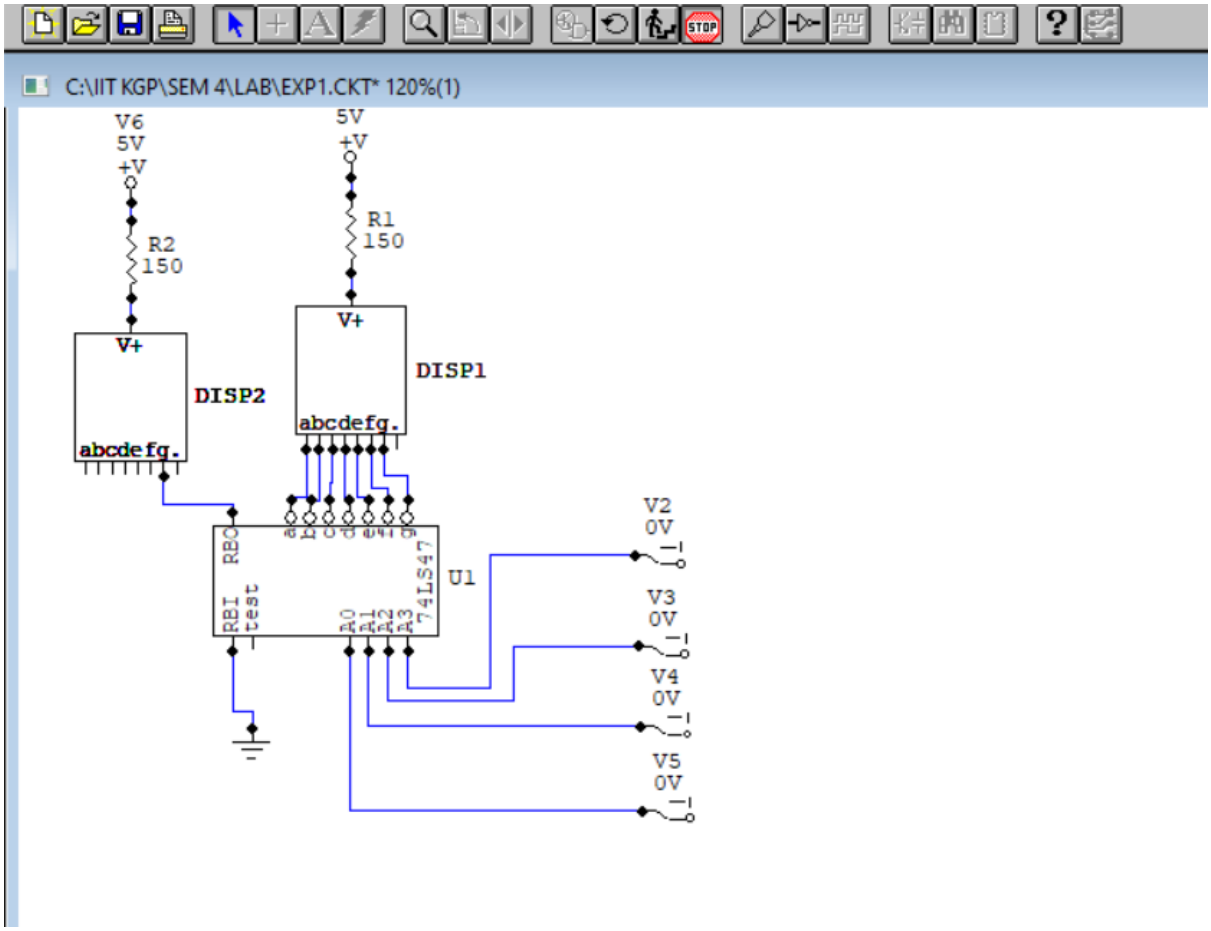


As expected all the segments are ON, as in a lamp test, we expect to check if all the LED segments are working or not.

Part3.

When RBI and inputs A, B, C, D are at a low level with the LT input HIGH, all segments go OFF and the RBO goes to a low level response

To do this, ground RBI and apply 0V to A0, A1, A2, A3 and connect RBO to another display, here I connected to g terminal of Display 2. Upon running the first display is blank indicating the segments are OFF. If RBO goes to low level, which means ground potential, the g segment of the second display must be ON, but when the simulation is run, the g segment keeps on blinking which suggests the RBO is indeed grounded, but while taking a snapshot of the simulation, the software isn't showing the line on the image. Circuit diagram is given below,

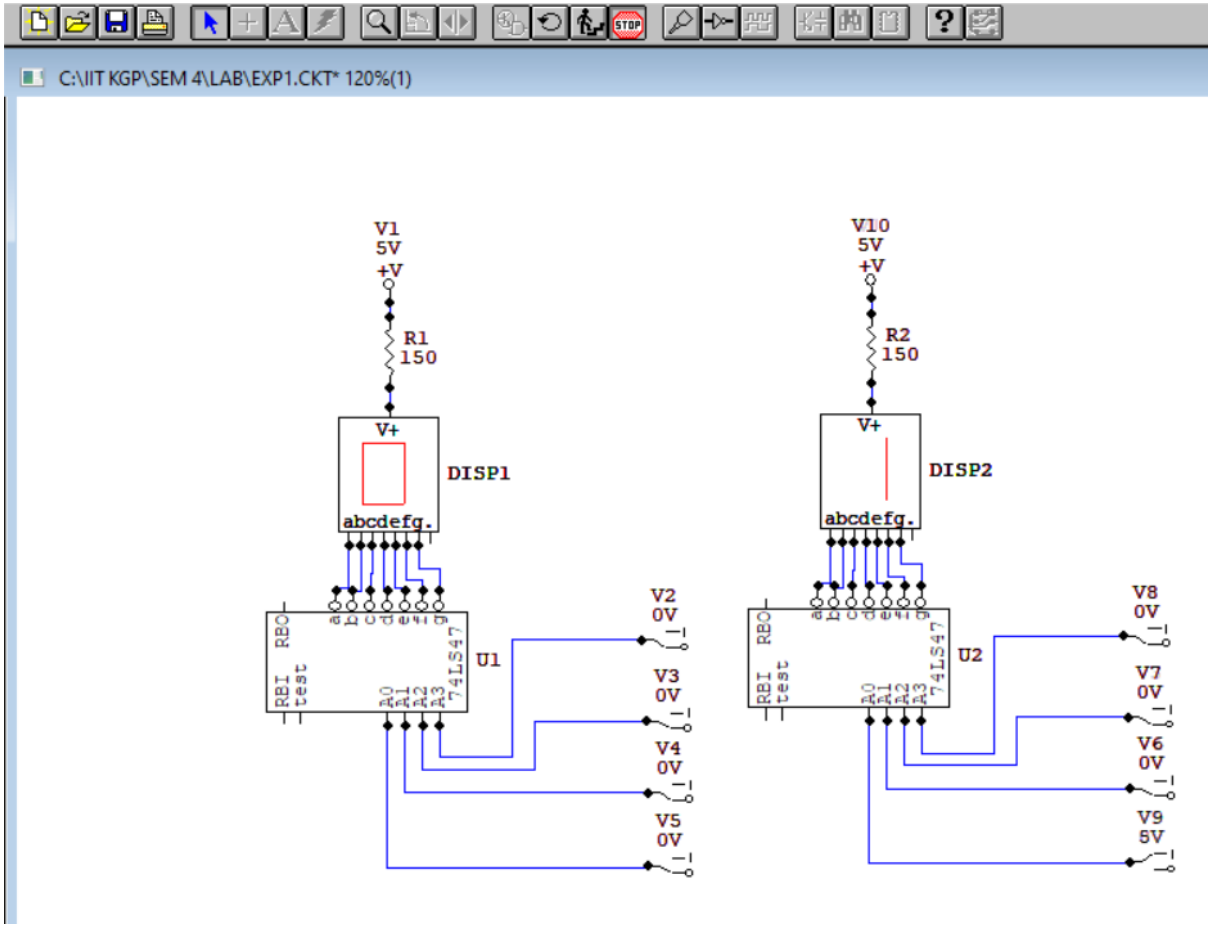


**When actually run the middle line blinks on the second display.*

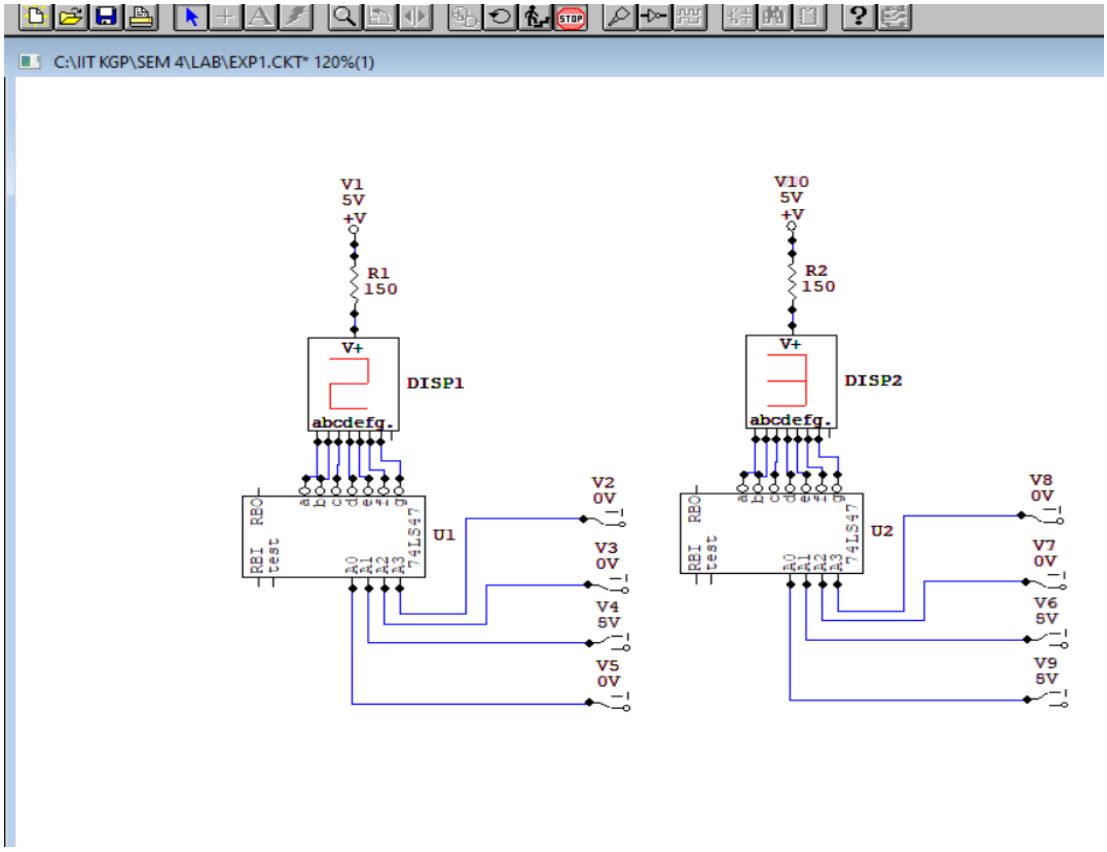
Part4.

Verify operation of CA (common anode) 7-segment display.

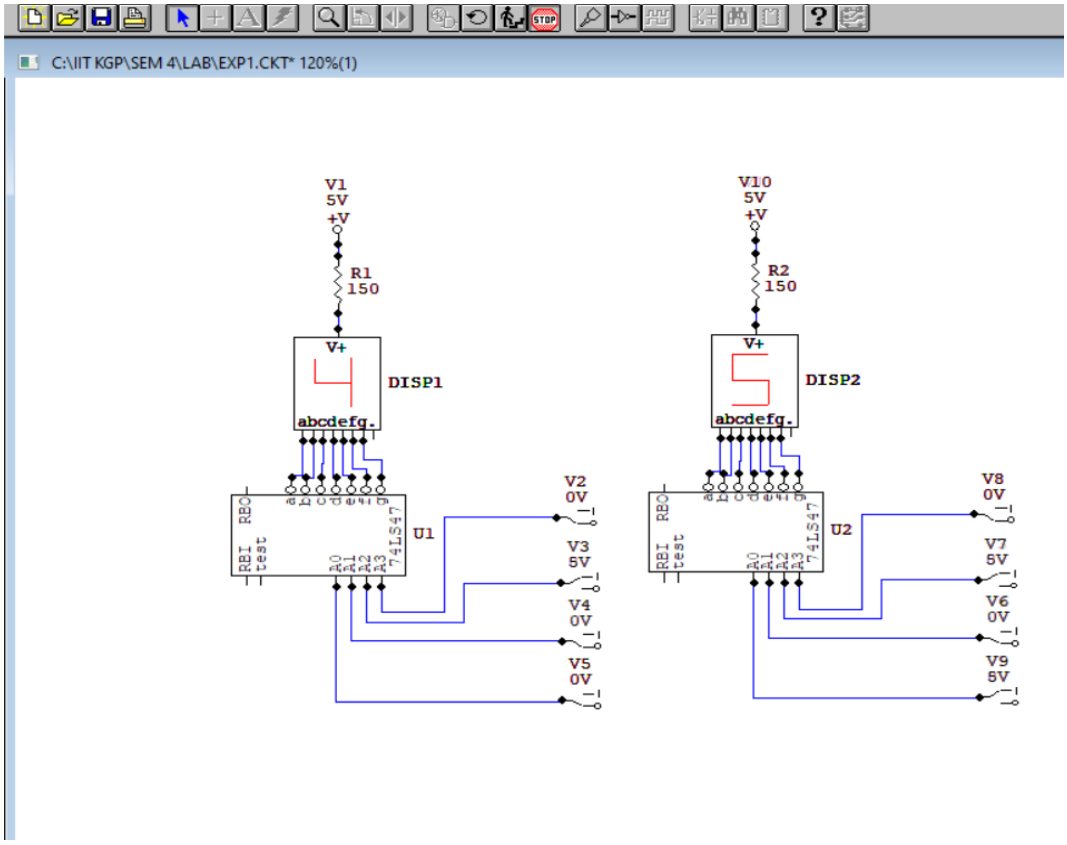
In order to verify the operation of our display, lets connect the terminals A0, A1, A2, A3 of 7447 to 4 logic switches which can be set to either high or low and check manually for each of 16 combinations,



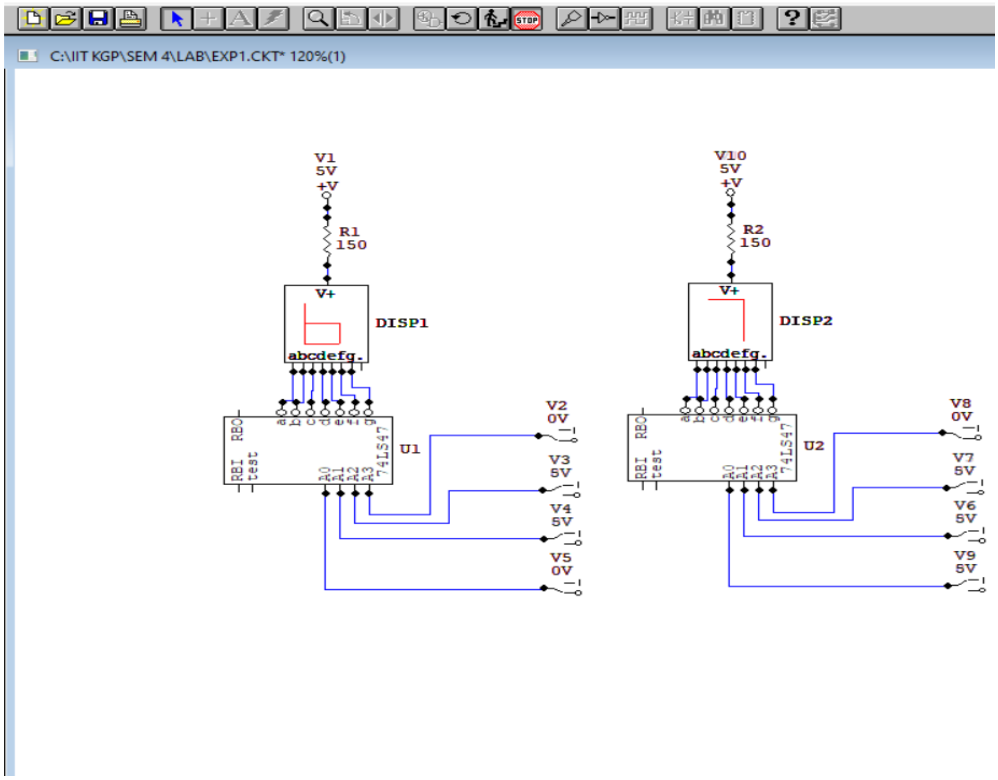
Display output for 0000 and 0001



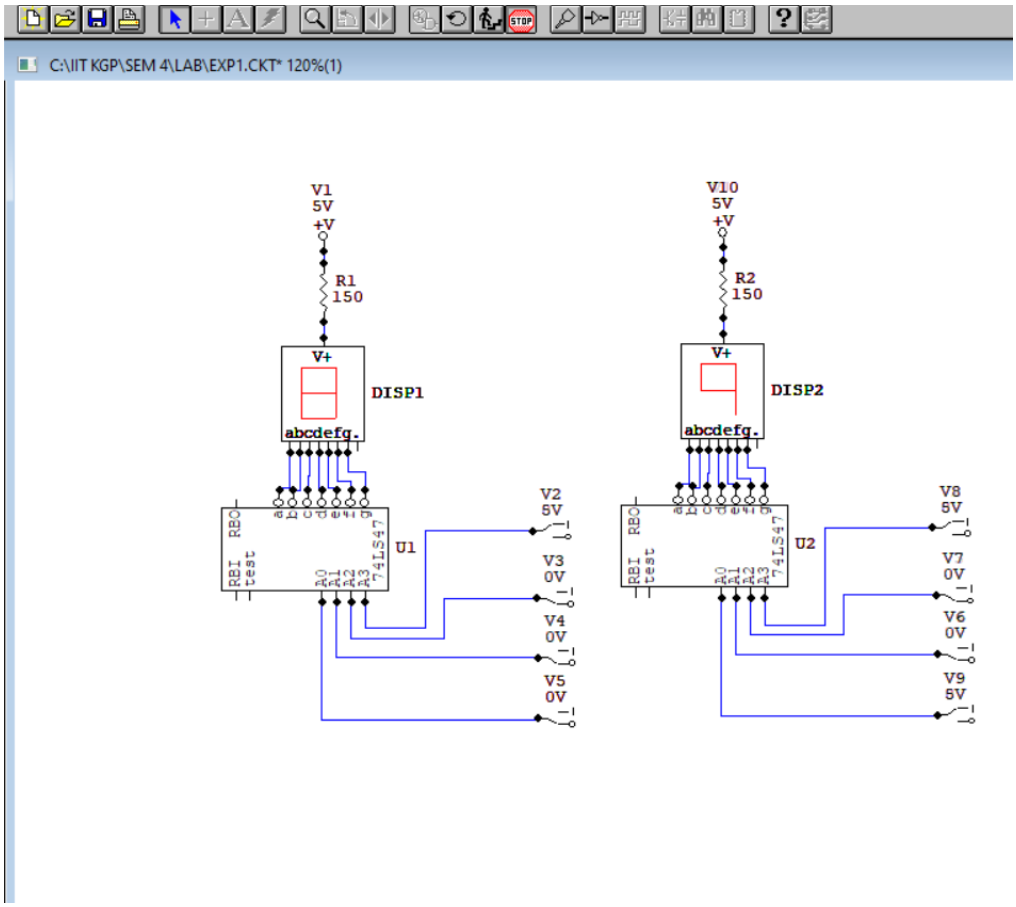
Display outputs for 0010 and 0011



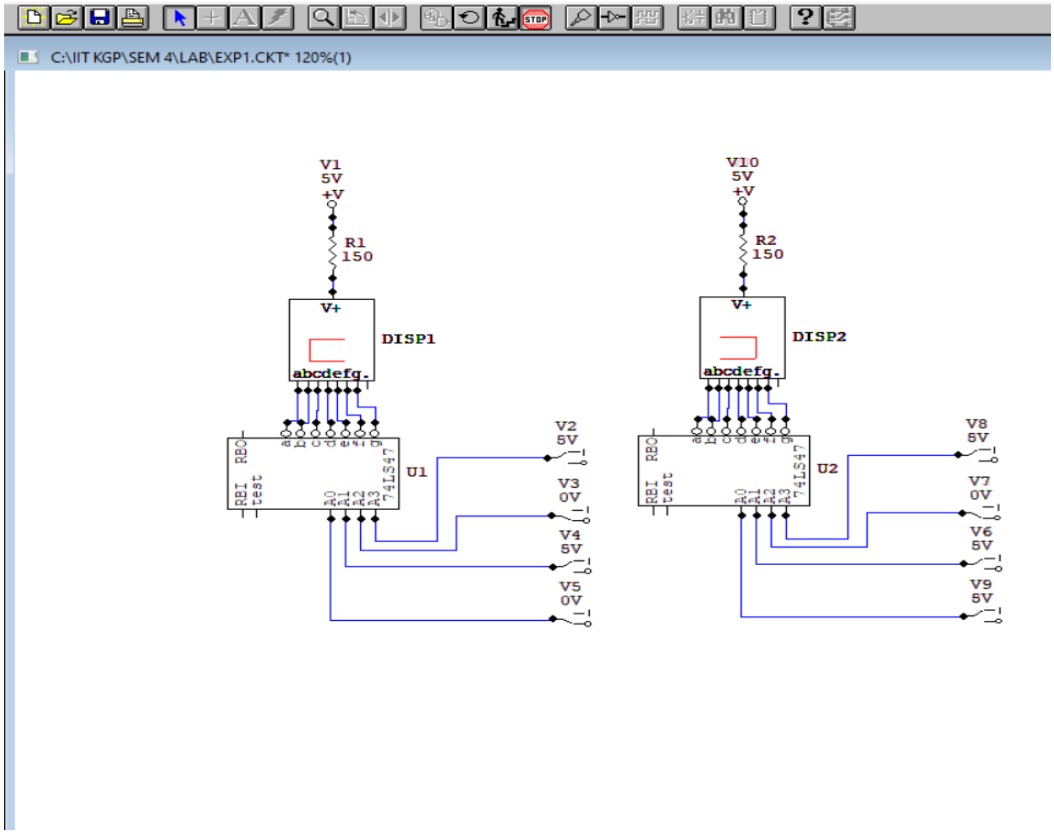
Display outputs for 0100 and 0101



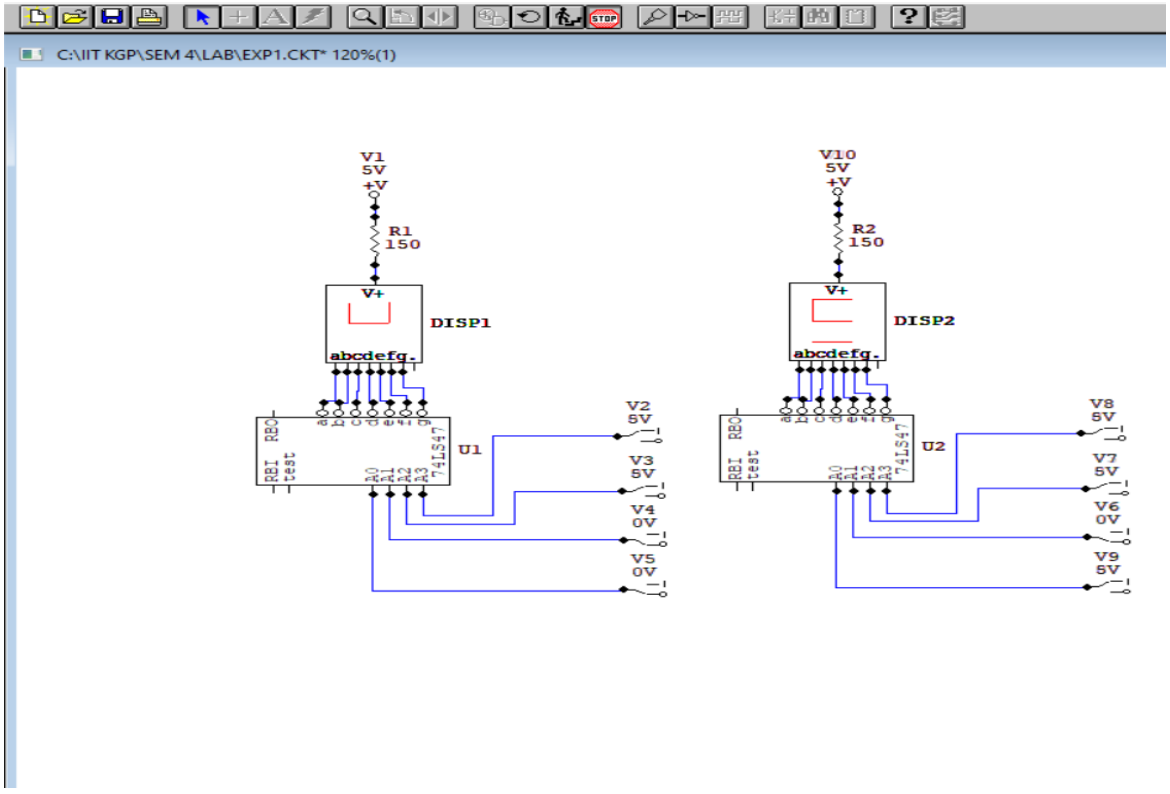
Display outputs for 0110 and 0111



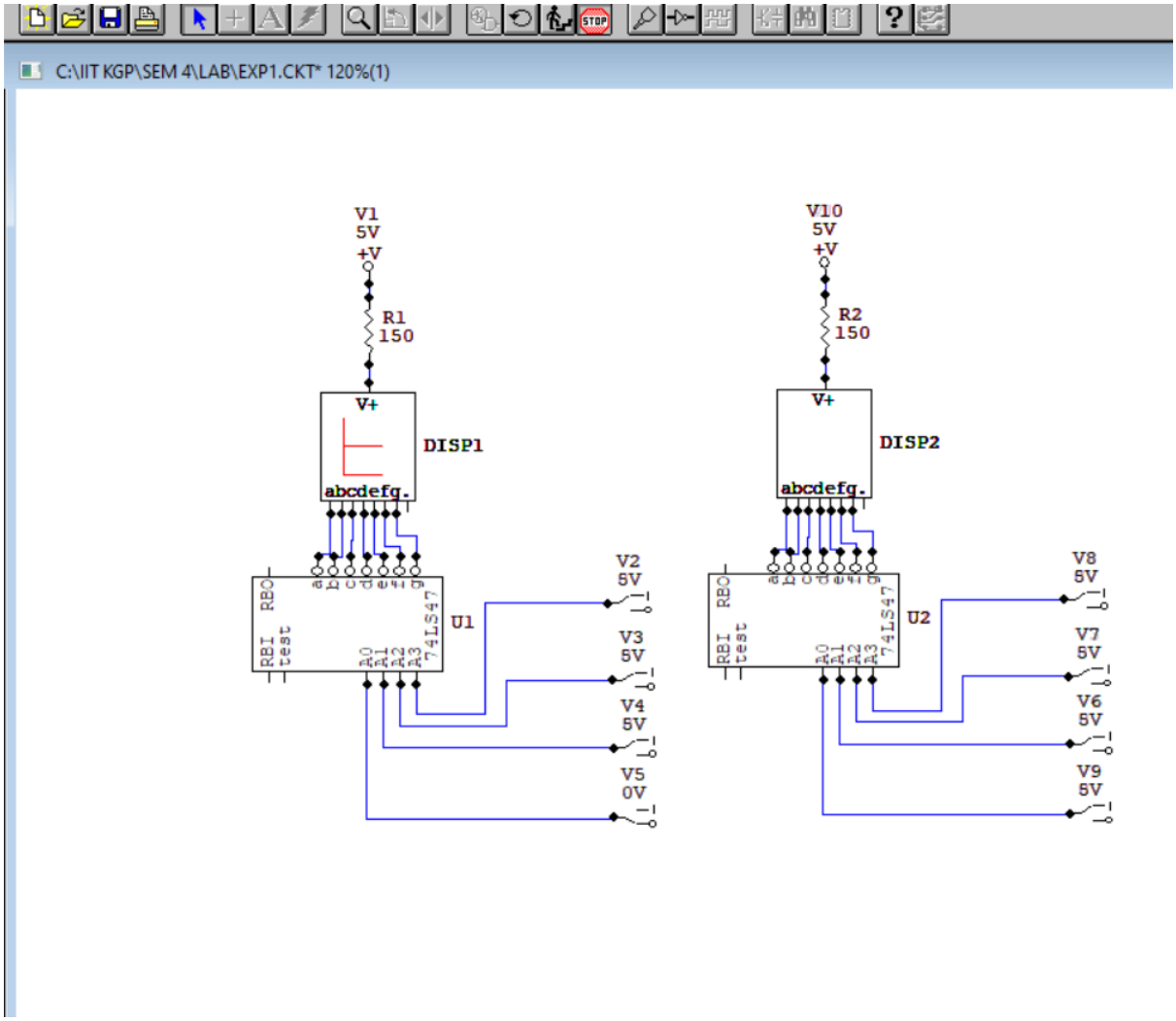
Display outputs for 1000 and 1001



Display outputs for 1010 and 1011



Display outputs for 1100 and 1101



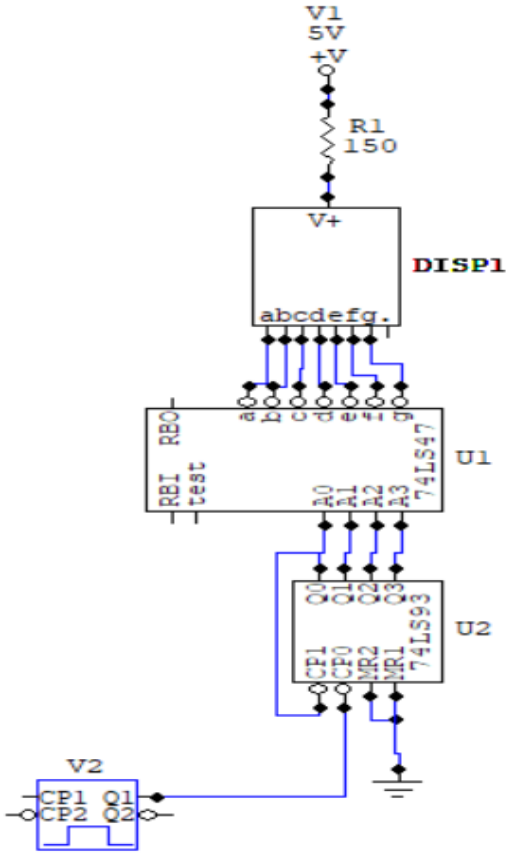
Display outputs for 1110 and 1111.

As we see all the outputs match from 0 to 15 combinations, and in the next part we do in with a pulser signal where it will automatically change to the next one.

Part5.

Verify normal operation of 7447, i.e., obtaining sixteen display patterns for input A3A2A1A0 = 0000 to 1111, keeping BI and LT high using IC 7493/ modulo-16 counter.

We connect the A0, A1, A2, A3 pins of IC 7447 to Q0, Q1, Q2, Q3 pin of IC 7493 respectively, and ground both the MR1 and MR2 pins, we connect CP1 to Q0 so that we see all patterns from 0 to 15 instead of just 0 and 1. And the IC is driven by a digital pulser who's Q1 pin is attached to CP0 of IC 7493. Circuit diagram is given below,



I have attached the .ckt file which can be used for checking the working of the circuit.

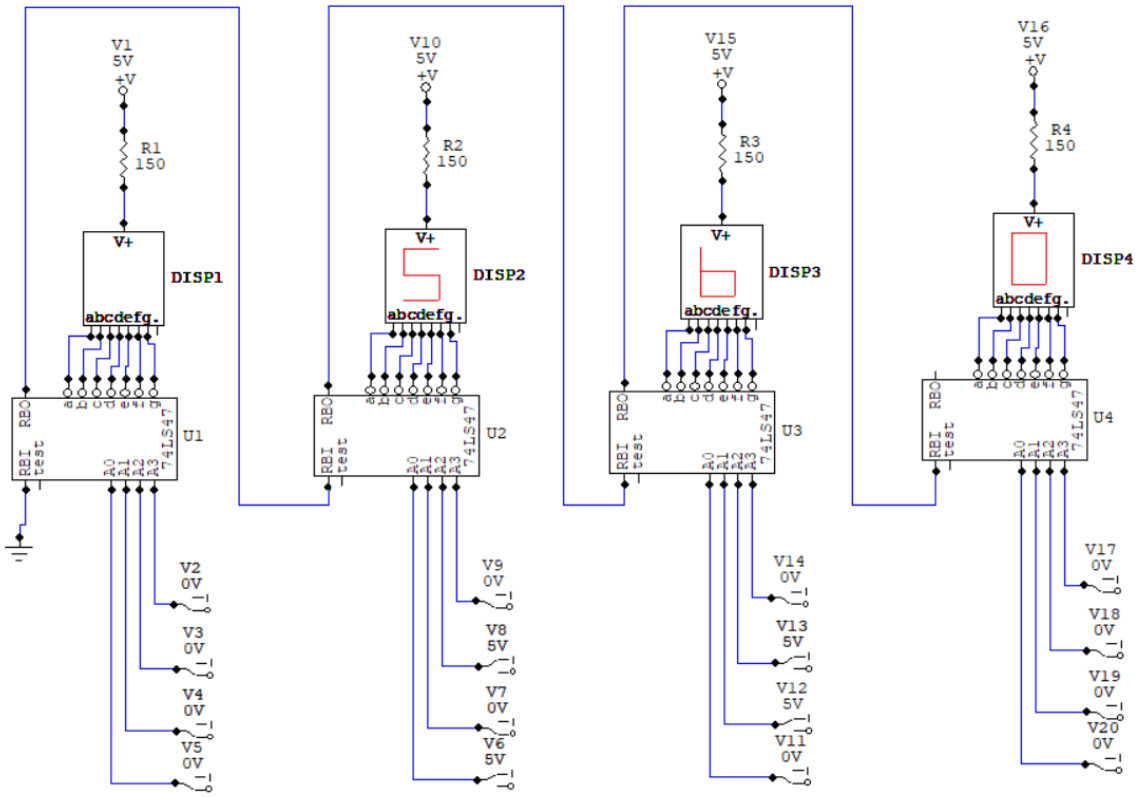
Part6.

Verify the effect of special control inputs BI and LT, and the effect of RBI and A3A2A1A0 = 0 on RBO and display.

This is basically the part-1,2 and 3 of this report, where all the asked parts are already verified.

Part7.

Demonstrate how to blank leading zeroes in a multi digit display.



As we can see I duplicated the same display unit 3 times, and made the following RBO – RBI connections, which will allow us to get our desired result. Here I gave input manually with logic switches, the combination is 0000 0101 0110 0000, As we can see the leading zero on 1st display is blank whereas the trailing zero on the 4th display is shown, this worked like this because of the functionality of the RBI and RBO pins. I will attach the .ckt file for checking purpose.