

DIGITAL ELECTRONIC CIRCUITS LAB

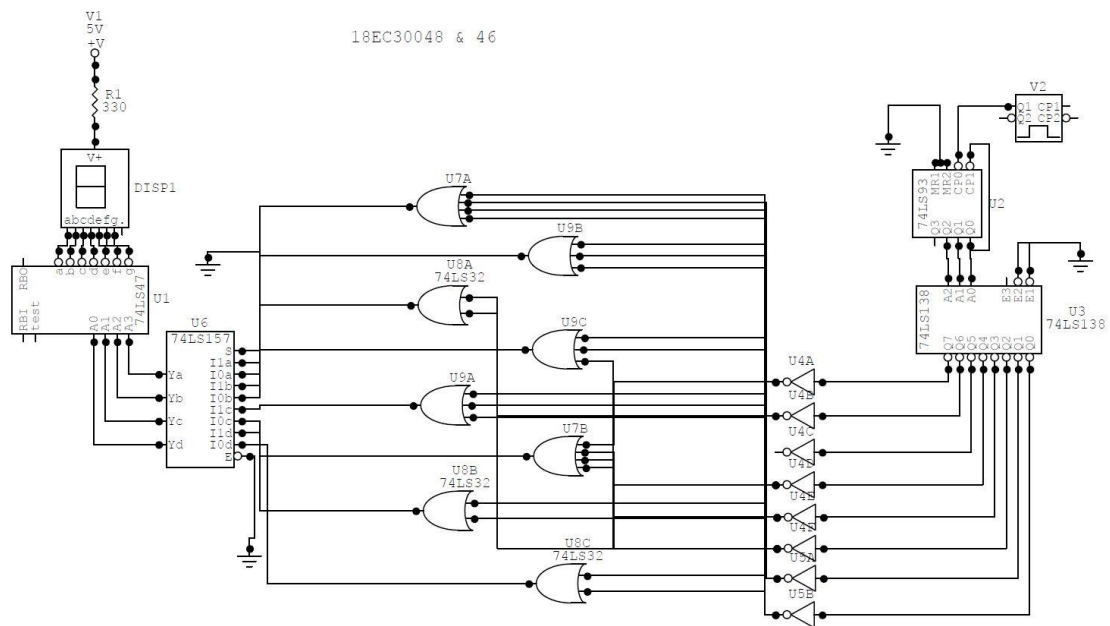
EXPERIMENT 4

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Objective

To display the 8 characters of two different roll number one after another using 74157 IC, 74138 IC, 7447 IC, 7493 IC, 7-segment display and logic gates.

Circuit Diagram



Truth Table

In this experiment, $\langle Y_7, Y_6, Y_5, Y_4, Y_3, Y_2, Y_1, Y_0 \rangle$ denotes the complement of output from 74138 IC, and $\langle A_3, A_2, A_1, A_0 \rangle$ and $\langle B_3, B_2, B_1, B_0 \rangle$ denotes the input to 74157 IC.

m	Y_7	Y_6	Y_5	Y_4	Y_3	Y_2	Y_1	Y_0	A_3	A_2	A_1	A_0	B_3	B_2	B_1	B_0
0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1
1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
2	0	0	0	0	0	1	0	0	1	1	1	0	1	1	1	0
3	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	1
5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0
7	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0

On simplifying, we get,

$$A_0 = Y_1 + Y_4$$

$$A_1 = Y_2 + Y_3 + Y_4$$

$$A_2 = Y_2 + Y_6$$

$$A_3 = Y_1 + Y_2 + Y_3 + Y_7$$

$$B_3 = Y_1 + Y_2 + Y_3$$

$$B_2 = Y_2 + Y_6 + Y_7$$

$$B_1 = Y_2 + Y_3 + Y_4 + Y_7$$

$$B_0 = Y_0 + Y_4$$

Results

In this experiment, we needed to display two different roll numbers which are **18EC3048** and **18EC3046** on the 7-segment display as per the value of switch of the Quad 4-to-1 MUX. We chose $S = 0$ for **18EC3046**, and $S = 1$ for **18EC3048**.

The recording of the simulation can be viewed by visiting following link:

<https://drive.google.com/file/d/10ei7gJjMp4Z5WsEg1sC8D90ly5ZwZdAW/view?usp=sharing>

Discussion:

- In this experiment, a counter is used as a clock to produce the input sequence $[0, 1, 0, 1, 0, 1, \dots]$.
- Clock is connected to 7493 IC, which converts it to modulo 8 number sequence $[0, 1, 2, 3, 4, 5, 6, 7, 0, 1, 2, \dots]$.
- This number sequence is then passed through 74138 IC (3 to 8 decoder) which excites a given terminal as per its input. For example, if the input is $x = 7$, then the seventh terminal will be off, other terminals will be on.
- Every terminal of 74138 IC is connected to a NOT gate.
- Now, we encode the output of 74138 IC so that we can use it to display the roll numbers.
- $\langle A_3, A_2, A_1, A_0 \rangle$ is the encoding for **18EC3048** and $\langle B_3, B_2, B_1, B_0 \rangle$ is the encoding for **18EC3046**. This is done as per the truth table given above.
- We then use 74157 IC (quad 4-1 MUX) to display both the roll numbers on the 7-segment display as per the control input S .
- The output of 74157 IC is then fed to 7447 IC, which converts it into suitable codes compatible with 7-segment display.