

* Digital Electronics and Logic Design (DELD) - Practical Number - 6

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Title:- Comparators.

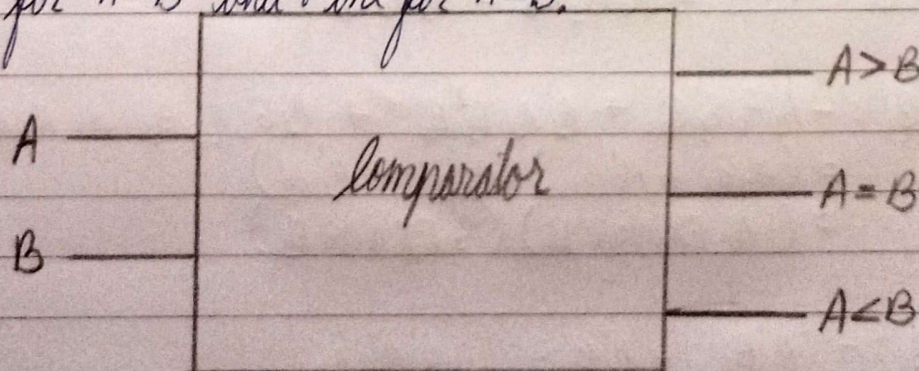
Aim:- To verify the truth-table of two bit comparators using logic gates.

Objective:- To study and verify the truth table of two bit comparators using logic gates.

Theory:-

A digital comparator is a combinational circuit that compares two digital or binary number in order to find out whether one binary number is equal, less than or greater than other binary number.

We logically design a circuit for which we will have two inputs one for A and other for B and have three output terminal. One for $A > B$, one for $A = B$ and one for $A < B$.



Truth Table :-

Input				Output		
A_1	A_0	B_1	B_0	$A < B$	$A = B$	$A > B$
0	0	0	0	0	1	0
0	0	0	1	1	0	0
0	0	1	0	1	0	0
0	0	1	1	1	0	0
0	1	0	0	0	0	1
0	1	0	1	0	1	0
0	1	1	0	1	0	0
0	1	1	1	1	0	0
1	0	0	0	0	0	1
1	0	0	1	0	0	1
1	0	1	0	0	1	0
1	0	1	1	1	0	0
1	1	0	0	0	0	1
1	1	0	1	0	0	1
1	1	1	0	0	0	1
1	1	1	1	0	1	0

$$A > B :- A_1 B_1' + A_0 B_1' B_0' + A_1 A_0 B_0'$$

$$\begin{aligned} A = B & :- A_1 A_0 B_1' B_0' + A_1 A_0 B_1 B_0 + A_1 B_0 A_0 B_1 + A_1 A_0' B_1 B_0' \\ & = (A_0 B_0 + A_0' B_0') (A_1 B_1 + A_1' B_1') \\ & = (A_0 \text{ EX-NOR } B_0) (A_1 \text{ EX-NOR } B_1) \end{aligned}$$

$$A < B :- A_1' B_1 + A_0' B_1 B_0 + A_1 A_0' B_0$$

Logic Diagram:-

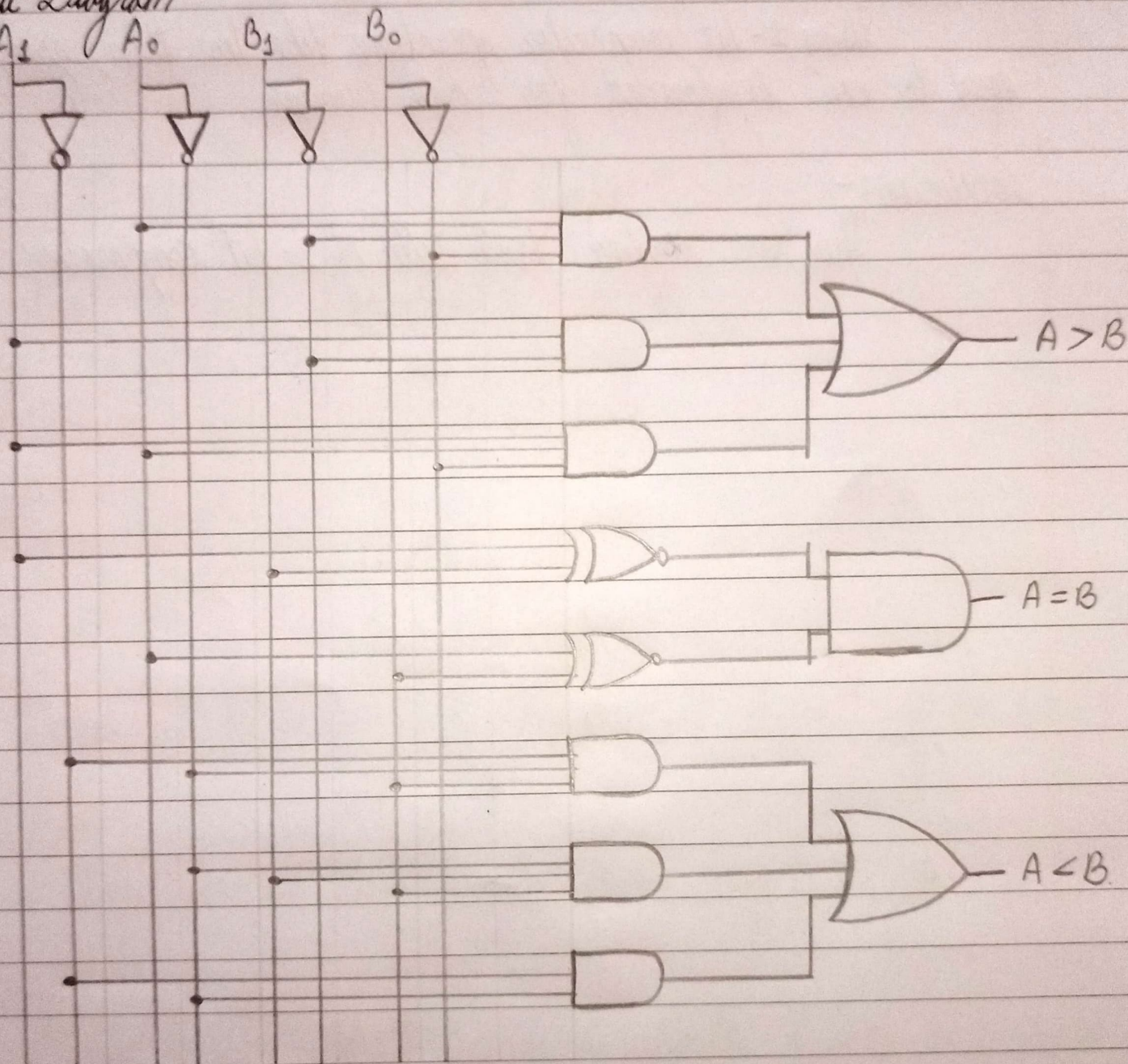
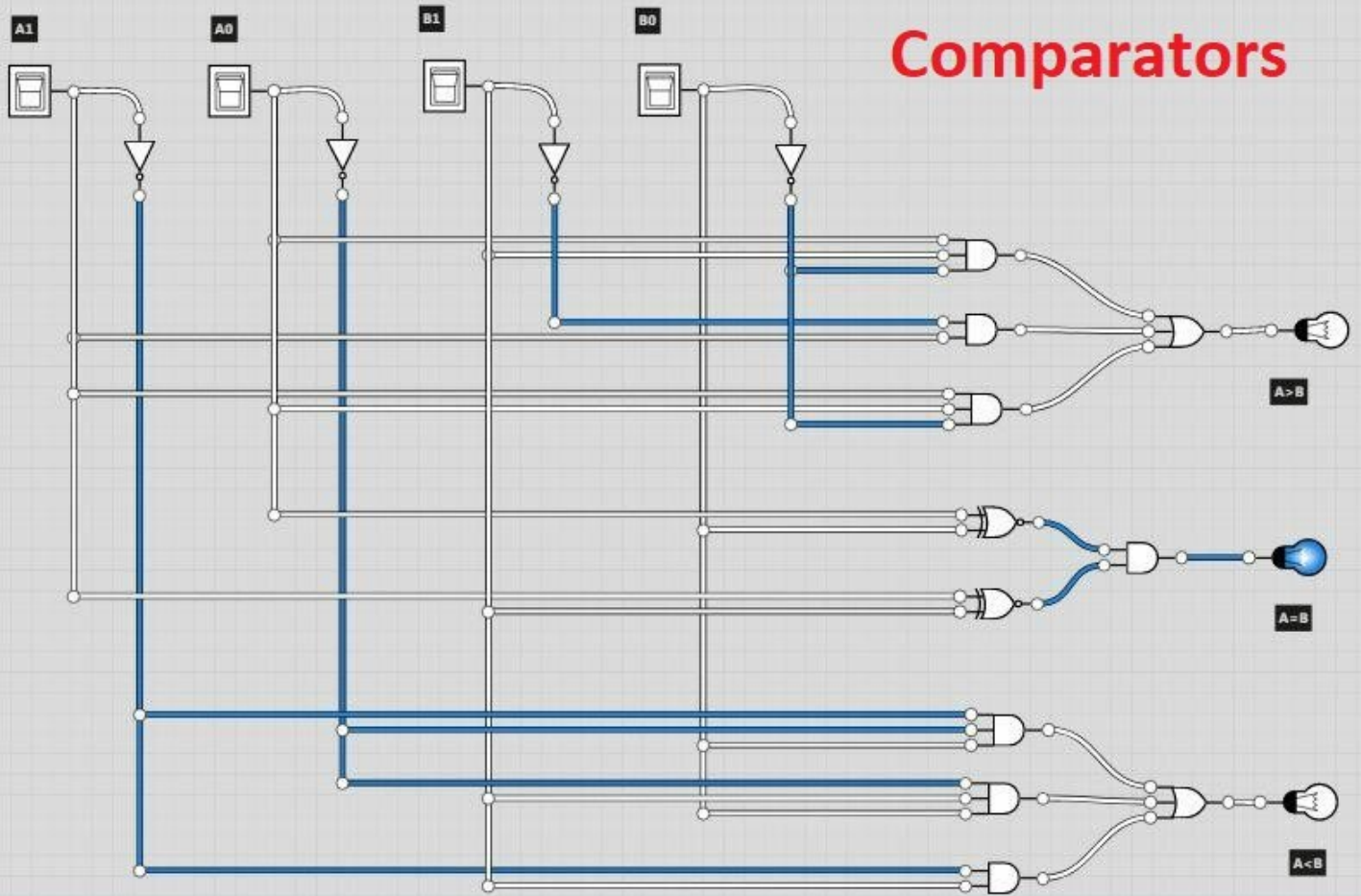
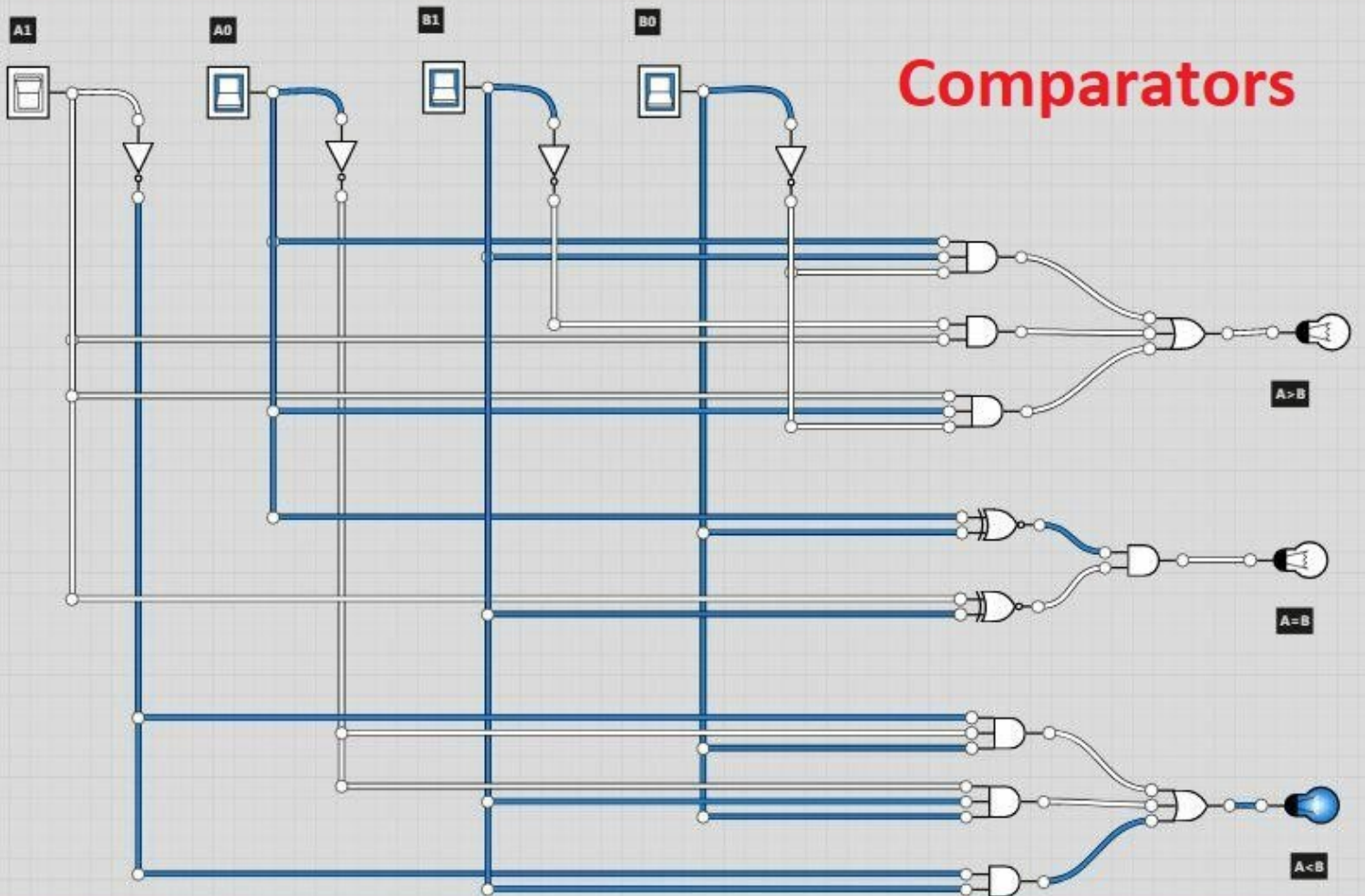


fig:- 2-bit comparator.

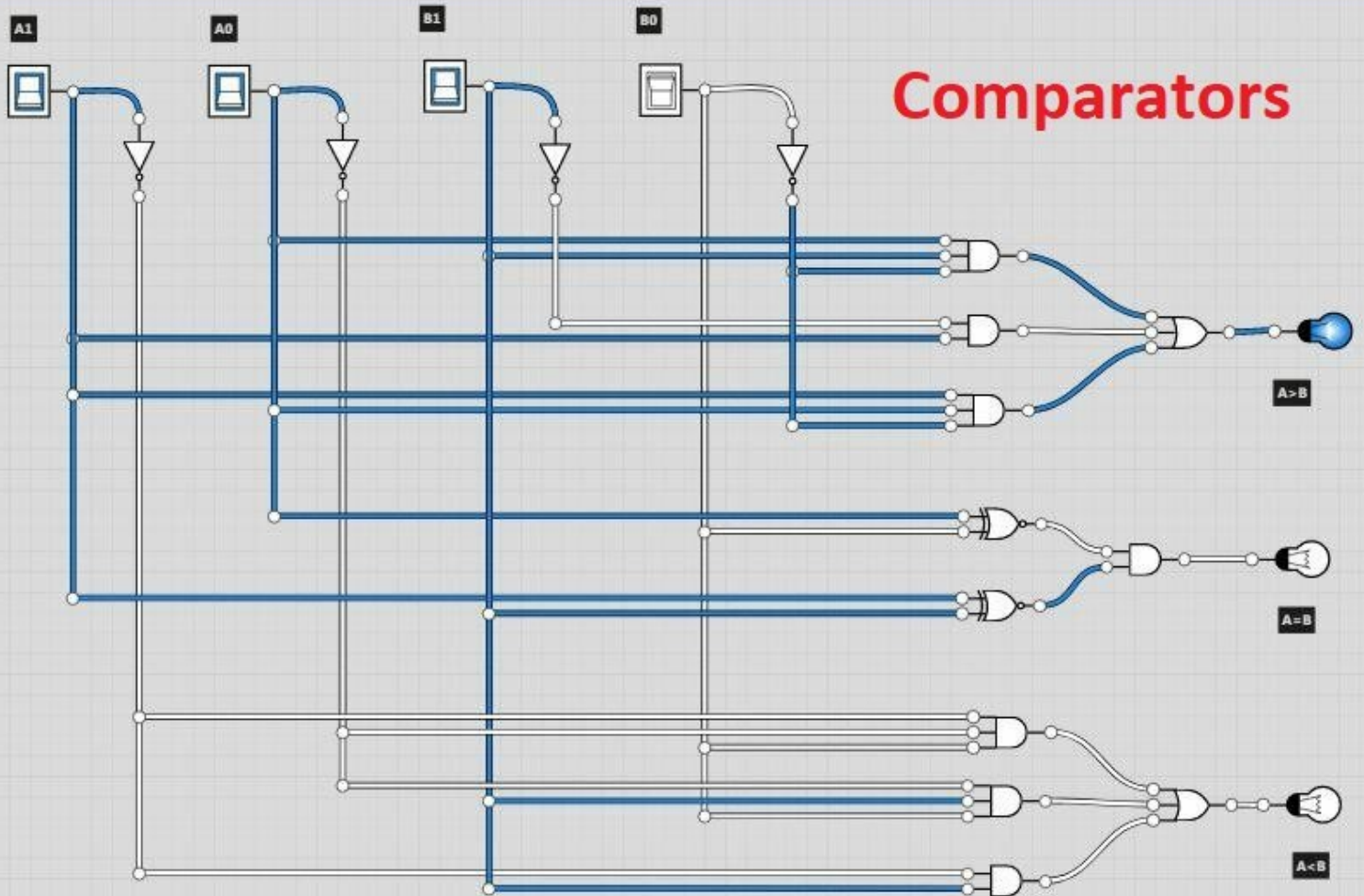
Comparators



Comparators



Comparators



Outcomes:-

Using 2-bit comparator operations like less than, greater than and equal to can be performed for 2 digit number.

Conclusion:-

Thus we verified truth table of 2-bit comparators.