

Course Name:	Digital Design Laboratory	Semester:	III
Date of Performance:	___ / ___ / _____	Batch No:	E2
Faculty Name:		Roll No:	16010123325
Faculty Sign & Date:		Grade/Marks:	___/25

Experiment No: 4
Title: 4-bit magnitude comparator

Aim and Objective of the Experiment:

To design and implement 1-bit comparator using logic gates and verify 4-bit magnitude comparator using IC 7485

COs to be achieved:

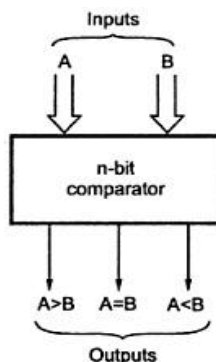
CO2: Use different minimization techniques and solve combinational circuits.

Tools used:

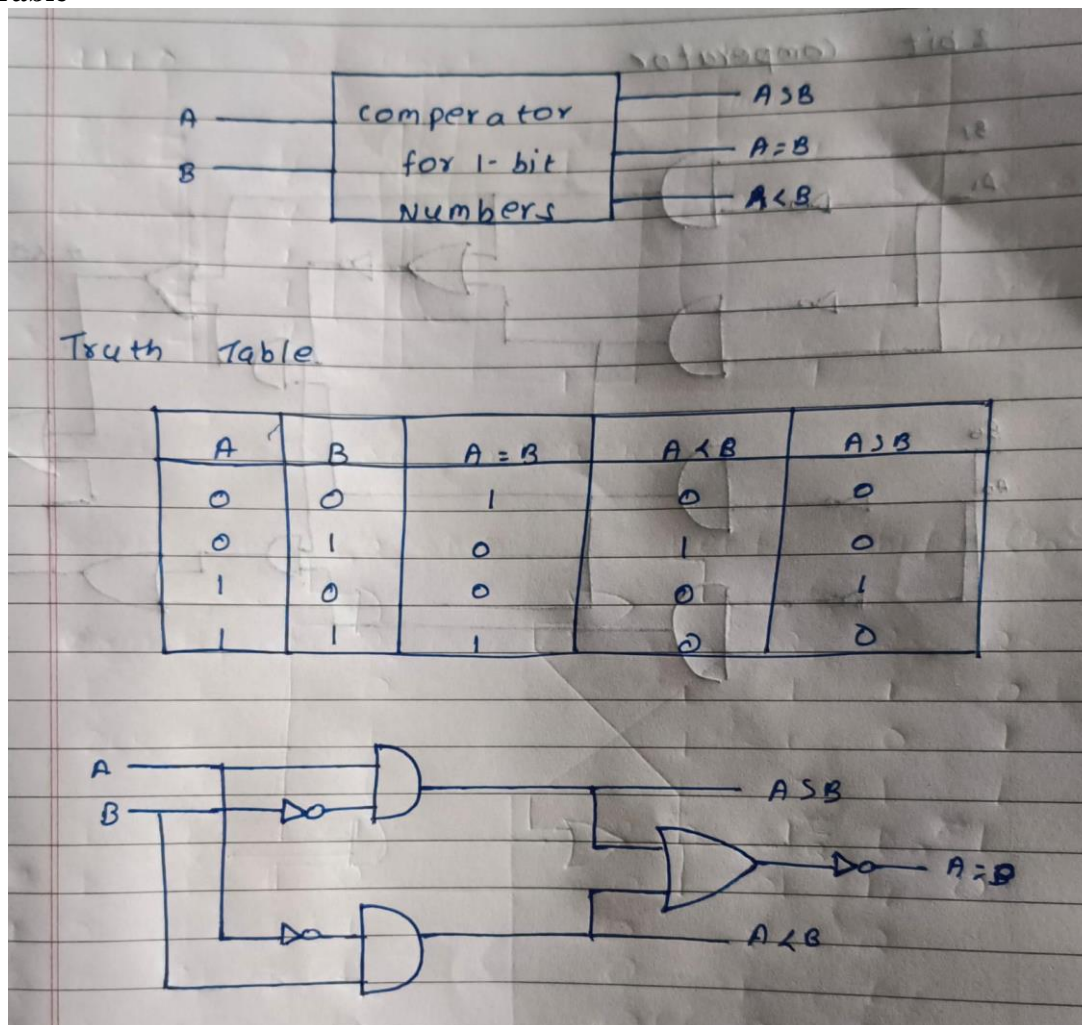
Trainer kits

Theory:

Comparator: The comparison of two numbers is an operator that determines one number is greater than, less than (or) equal to the other number. A magnitude comparator is a combinational circuit that compares two numbers A and B and determines their relative magnitude. The outcome of the comparator is specified by three binary variables that indicate whether $A > B$, $A = B$ (or) $A < B$.

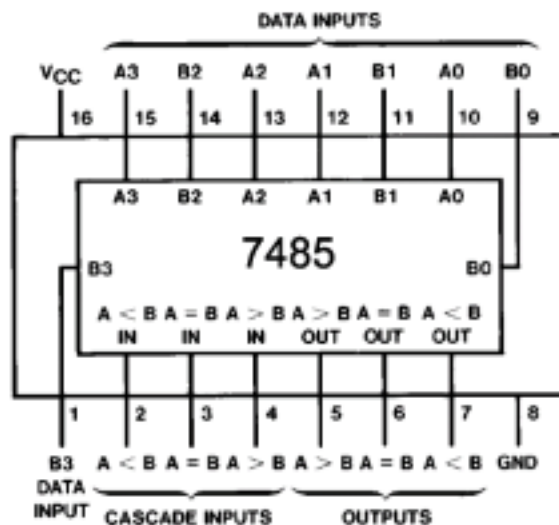


1-bit Comparator Implementation Details: Truth Table

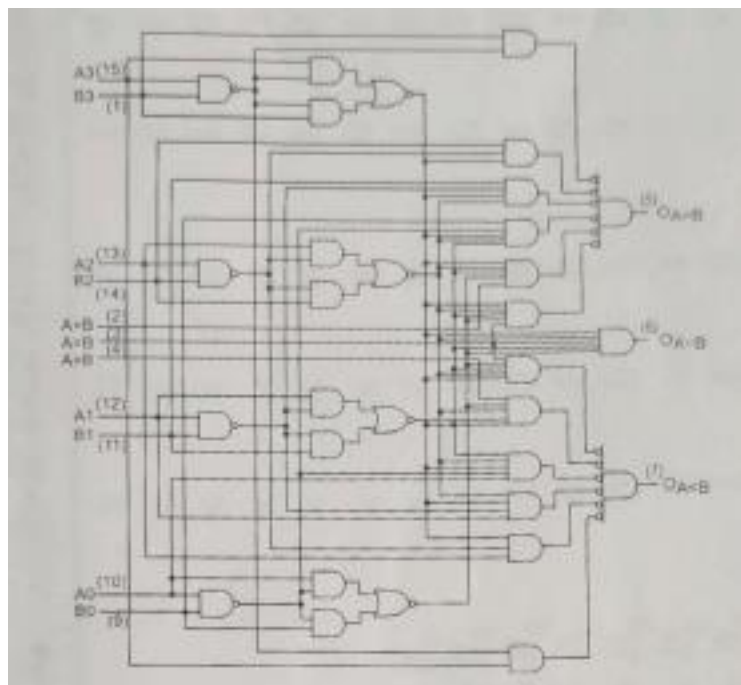


Four Bit Magnitude Comparator Implementation Details

Pin Diagram of IC 7485



Logic Diagram of IC 7485



Comparing Table

TRUTH TABLE									
COMPARING INPUTS				CASCADING INPUTS			OUTPUTS		
A ₃ B ₃	A ₂ B ₂	A ₁ B ₁	A ₀ B ₀	I _{A>B}	I _{A=B}	I _{A<B}	O _{A>B}	O _{A=B}	O _{A<B}
A ₃ >B ₃	X	X	X	X	X	X	H	L	L
A ₃ <B ₃	X	X	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ >B ₂	X	X	X	X	X	H	L	L
A ₃ =B ₃	A ₂ <B ₂	X	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ >B ₁	X	X	X	X	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ <B ₁	X	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ >B ₀	X	X	X	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ <B ₀	X	X	X	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	H	L	L	H	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	L	H	L	L	H	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	X	X	H	L	L	H
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	H	H	L	L	L	L
A ₃ =B ₃	A ₂ =B ₂	A ₁ =B ₁	A ₀ =B ₀	L	L	L	H	H	L

H = HIGH Level
 L = LOW Level
 X = IMMATERIAL

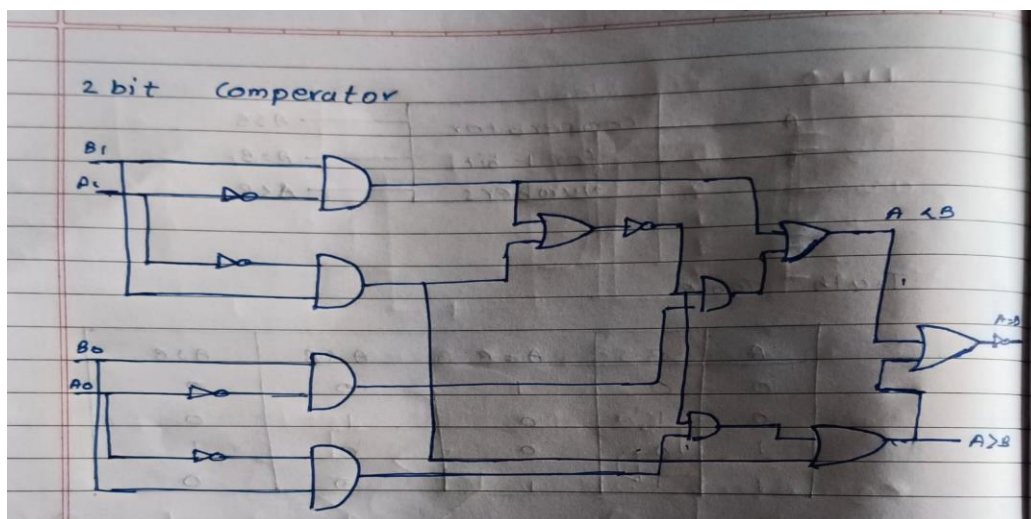
Implementation Details

Procedure:

- 1) Locate the IC 7485 on the trainer kit.
- 2) Connect 1st input no. to A₃-A₀ input slot and 2nd to B₃-B₀.
- 3) Connect the output Y_{A>B}, Y_{A<B} and Y_{A=B} to the output indicators.
- 4) Switch ON the power supply and monitor the output for various input combinations.

Post Lab Subjective/Objective type Questions:

1. Design 2-bit magnitude comparator.



2. How can we implement 5-bit magnitude comparator using IC 7485.

To implement a 5-bit magnitude comparator using IC 7485:

1. **Use Two ICs:** IC 7485 is a 4-bit comparator; use two ICs.
 2. **Connect First IC:** Inputs for the 4 MSBs of the numbers; get the comparison result for these bits.
 3. **Connect Second IC:** Input the LSBs; combine with the results from the first IC.
- Combine Outputs:** Use the outputs from both ICs to determine if the numbers are equal, greater than, or less than each other.

Conclusion:

Thus, in this experiment, we learned about binary comparators and how to implement them using IC7485.

Signature of faculty in-charge with Date: