EXPERIMENT: 7 COMPARATORS

AIM: To realize One & Two Bit Comparator and study of 7485 magnitude comparator.

LEARNING OBJECTIVE:

- To learn about various applications of comparator
- To learn and understand the working of IC 7485 magnitude comparator
- To learn to realize 8-bit comparator using 4-bit comparator

THEORY:

Magnitude Comparator is a logical circuit, which compares two signals A and B and generates three logical outputs, whether A > B, A = B, or A < B. IC 7485 is a high speed 4-bit Magnitude comparator , which compares two 4-bit words . The A = B Input must be held high for proper compare operation.

COMPONENTS REQUIRED:

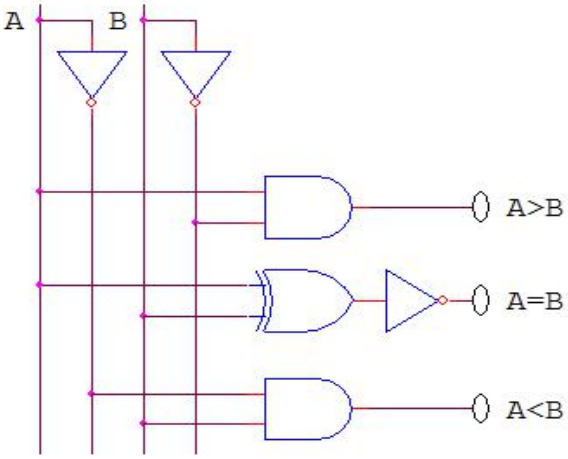
IC 7400, IC 7410, IC 7420, IC 7432, IC 7486, IC 7402, IC 7408, IC 7404, IC 7485, Patch Cords

1) 1- BIT COMPARATOR

$A>B = A\bar{B}$

$A<B = \bar{A}B$

$A=B = \bar{A}\bar{B} + AB$



TRUTH TABLE

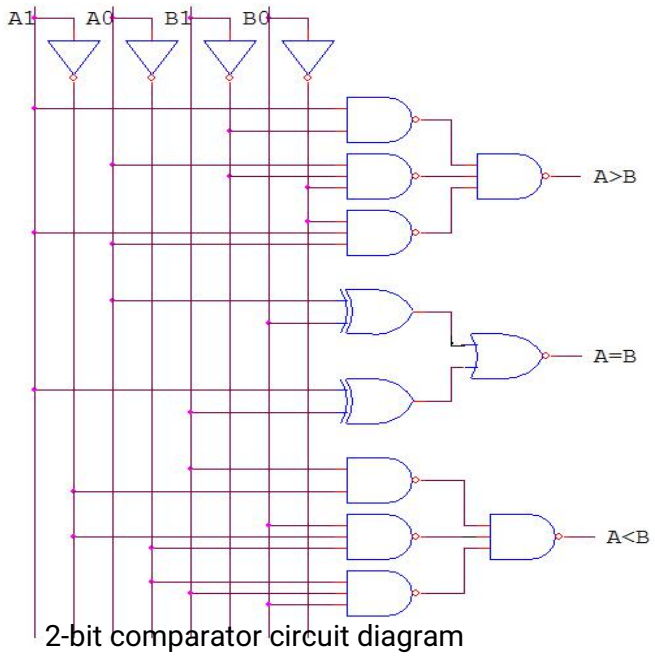
INPUTS		OUTPUTS		
A	B	A > B	A = B	A < B
0	0	0	1	0
0	1	0	0	1
1	0	1	0	0
1	1	0	1	0

2) 2- BIT COMPARATOR

$(A>B) = A1\,\overline{B1} + A0\,B1\,\overline{B}\,0 + \overline{B}\,0\,A1A0$

$(A=B) = (A0 \;\; B0)\,(A1 \;\; B1)$

$(A<B) = B1\,A1 + B0\,\overline{A1\,A}\,0 + \overline{A}\,0B1B0$

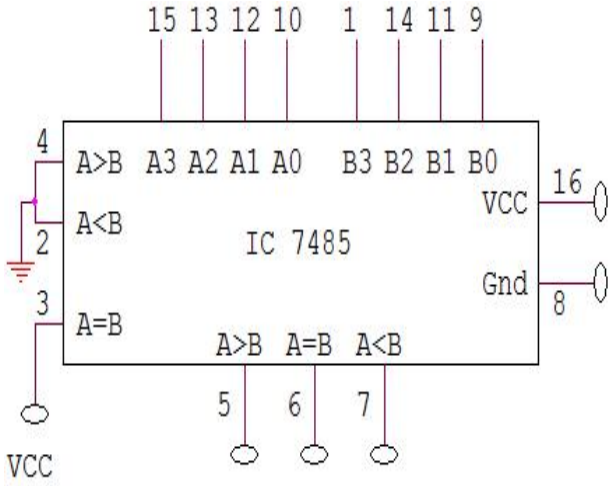


2-bit comparator circuit diagram

TRUTH TABLE

INPUTS				OUTPUTS		
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	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

3) TO COMPARE THE GIVEN DATA USING 7485 CHIP.



A				B				Result
A3	A2	A1	A0	B3	B2	B1	B0	
0	0	0	1	0	0	0	0	A > B
0	0	0	1	0	0	0	1	A = B
0	0	0	0	0	0	0	1	A < B

PROCEDURE:

1 Check all the components for their working.
2 Insert the appropriate IC into the IC base.
3 Make connections as shown in the circuit diagram.
4 Verify the Truth Table and observe the outputs.

Postlab Questions

1. **Design 8 bit comparator using two 7485**
2. **Write applications of Comparator**