EXPT NO. : 6

DESIGN AND IMPLEMENTATION OF MAGNITUDE COMPARATOR

AIM: To design and implement

(i) 2 – Bit magnitude comparator using basic gates.

(ii) 8 – Bit magnitude comparator using IC 7485.

APPARATUS REQUIRED:

Sl. No.	COMPONENT	SPECIFICATION	QTY.
1.	AND GATE	IC 7408	2
2.	X-OR GATE	IC 7486	1
3.	OR GATE	IC 7432	1
4.	NOT GATE	IC 7404	1
5.	4-BIT MAGNITUDE COMPARATOR	IC 7485	2
6.	BREAD BOARD	-	1
7.	PATCH CORDS	-	-
8.	POWER SUPPLY WITH LOGIC PROBE	-	1

THEORY: The comparison of two numbers is an operator that determine 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 determine their relative magnitude. The outcome of the comparator is specified by three binary variables that indicate whether A>B, A=B (or) A<B.

$$A = A_3\ A_2\ A_1\ A_0$$

$$B = B_3\ B_2\ B_1\ B_0$$

The equality of the two numbers and B is displayed in a combinational circuit designated by the symbol (A=B).

This indicates A greater than B, then inspect the relative magnitude of pairs of significant digits starting from most significant position. A is 0 and that of B is 0.

We have A<B, the sequential comparison can be expanded as

$A>B = A3B_3^1 + X_3A_2B_2^1 + X_3X_2A_1B_1^1 + X_3X_2X_1A_0B_0^1$

$A<B = A_3^1B_3 + X_3A_2^1B_2 + X_3X2A_1^1B_1 + X_3X_2X_1A_0^1B_0$

The same circuit can be used to compare the relative magnitude of two BCD digits.

Where, A = B is expanded as,

$A = B = (A_3 + B_3)(A_2 + B_2)(A_1 + B_1)(A_0 + B_0)$

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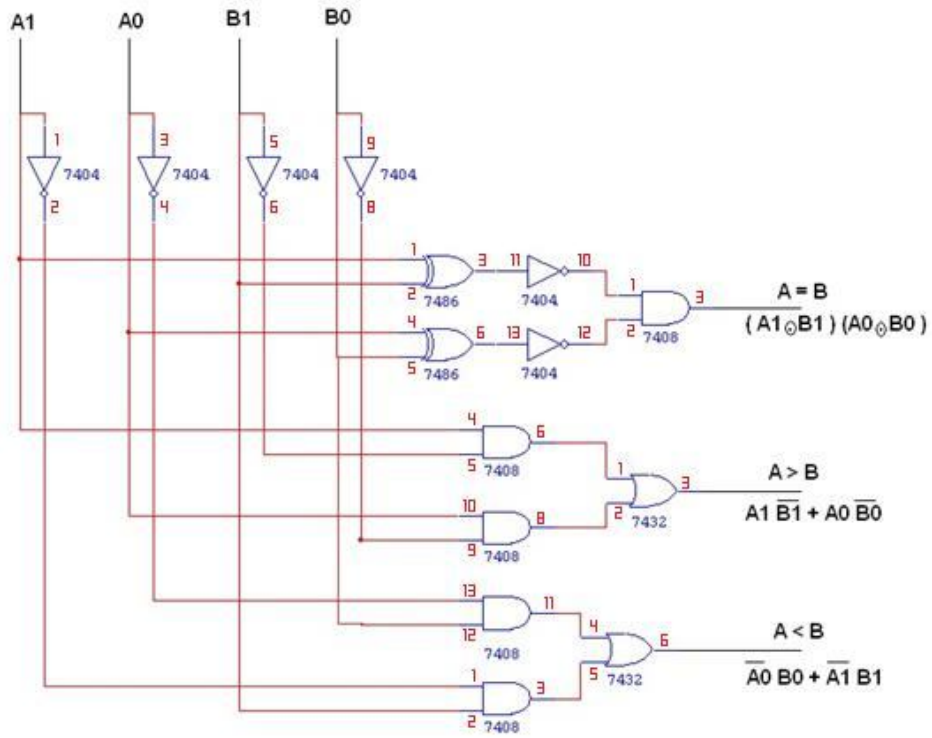
x_3 x_2 x_1 x_0

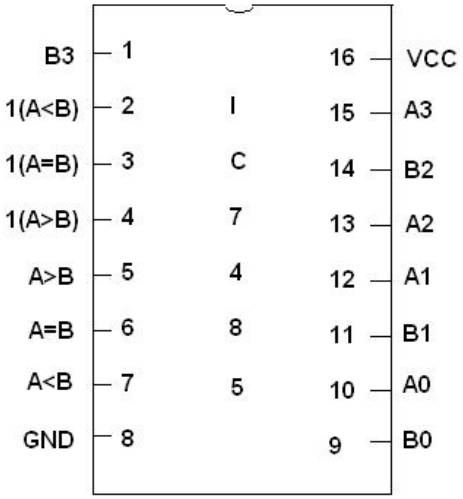
LOGIC DIAGRAM: 2 BIT MAGNITUDE COMPARATOR



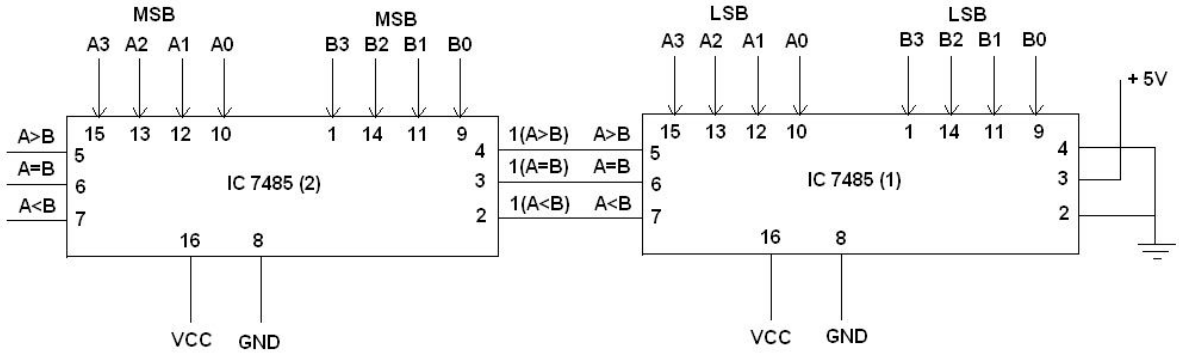
TRUTH TABLE:

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	1	0	0	1	0	0

PIN DIAGRAM FOR IC 7485:



LOGIC DIAGRAM: 8 BIT MAGNITUDE COMPARATOR



TRUTH TABLE:

A	B	A>B	A=B	A<B
0000 0000	0000 0000	0	1	0
0001 0001	0000 0000	1	0	0
0000 0000	0001 0001	0	0	1

PROCEDURE:

(i) Connections are given as per circuit diagram.

(ii) Logical inputs are given as per circuit diagram.

(iii) Observe the output and verify the truth table.

OBSERVATION TABLE:

CIRCUIT	INPUTS		OUTPUTS		
	A	B	A>B	A=B	A<B
2-BIT MAGNITUDE COMPARATOR					
8-BIT MAGNITUDE COMPARATOR					