SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++'(III Cycle) Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

23ECB201 – DIGIT AL SYSTEMS DESIGN

II YEAR/ III SEMESTER

UNIT 2 – COMBINATIONAL CIRCUITS

TOPIC- MAGNITUDE COMPARATOR

MAGNITUDE COMPARATOR

• A magnitude digital Comparator is a combinational circuit that **compares two digital or binary numbers** in order to find out whether one binary number is equal, less than, or greater than the other binary number.

1-Bit MAGNITUDE COMPARATOR

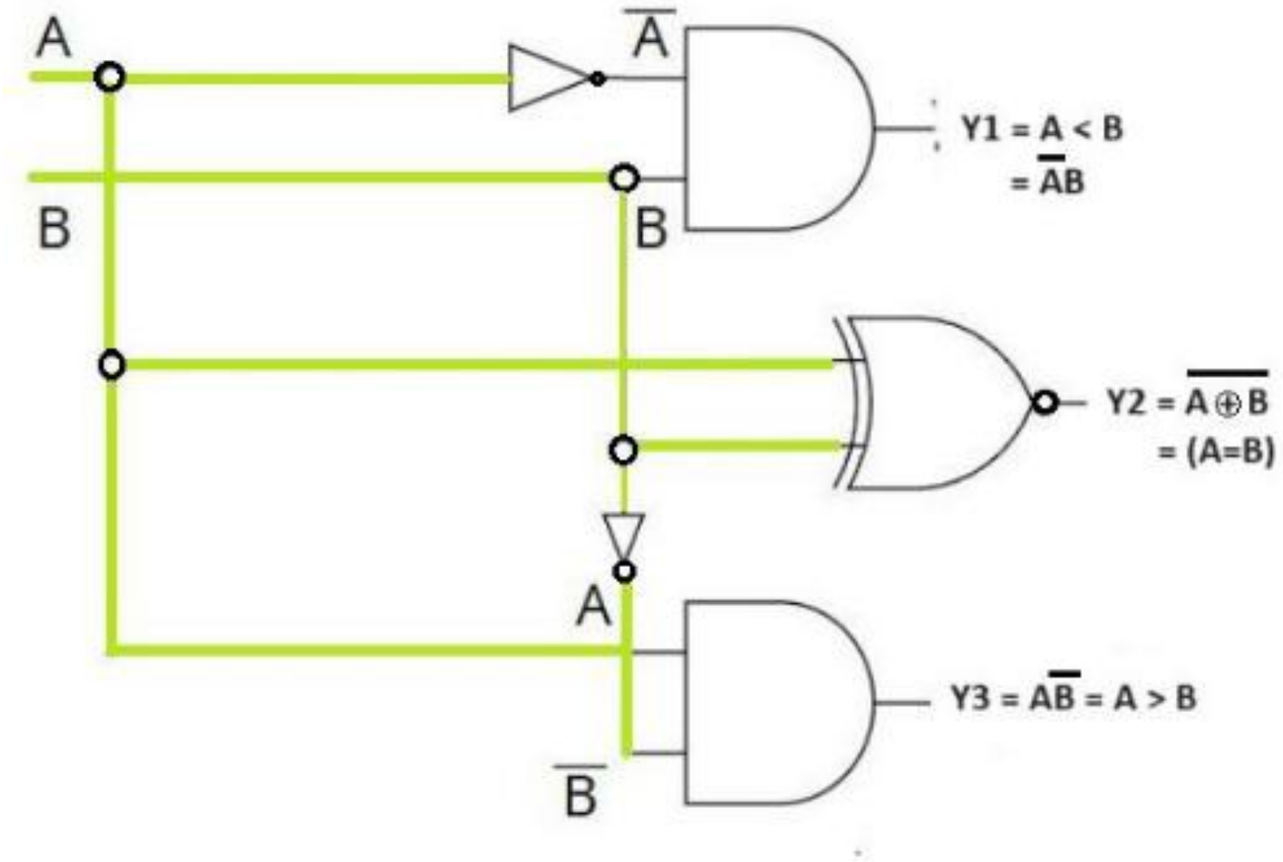
A	B	A=B	A<B	A>B
0	0	1	0	0
0	1	0	1	0
1	0	0	0	1
1	1	1	0	0

A>B: AB'

A<B: A'B

A=B: A'B' + AB

IMPLEMENTATION



A>B: AB'

A<B: A'B

A=B: A'B' + AB

2-Bit MAGNITUDE COMPARATOR

- A comparator used to compare two binary numbers each of two bits is called a 2-bit Magnitude comparator.

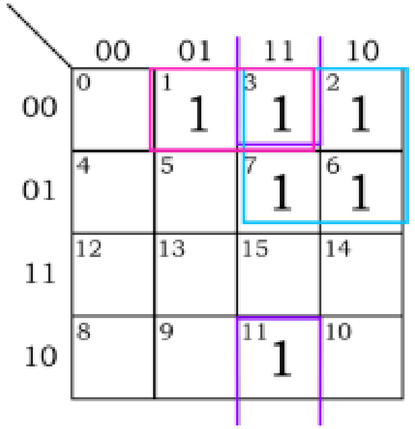
- It consists of four inputs and three outputs to generate less than, equal to, and greater than between two binary numbers.

2-Bit MAGNITUDE COMPARATOR

INPUT				OUTPUT		
A1	A0	B1	B0	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

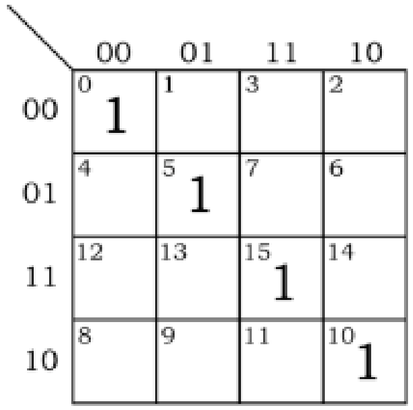
2-Bit MAGNITUDE COMPARATOR

K Map for A<B



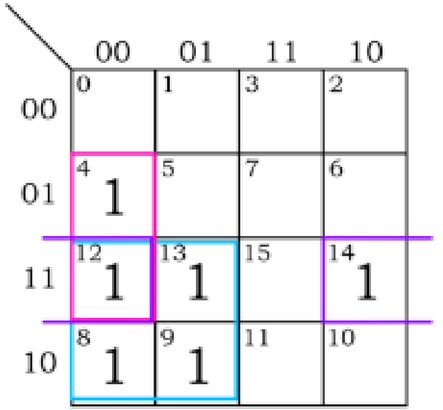
$Y = A_1'B_1 + A_1'A_0'B_0 + A_0'B_1B_0$

K Map for A=B



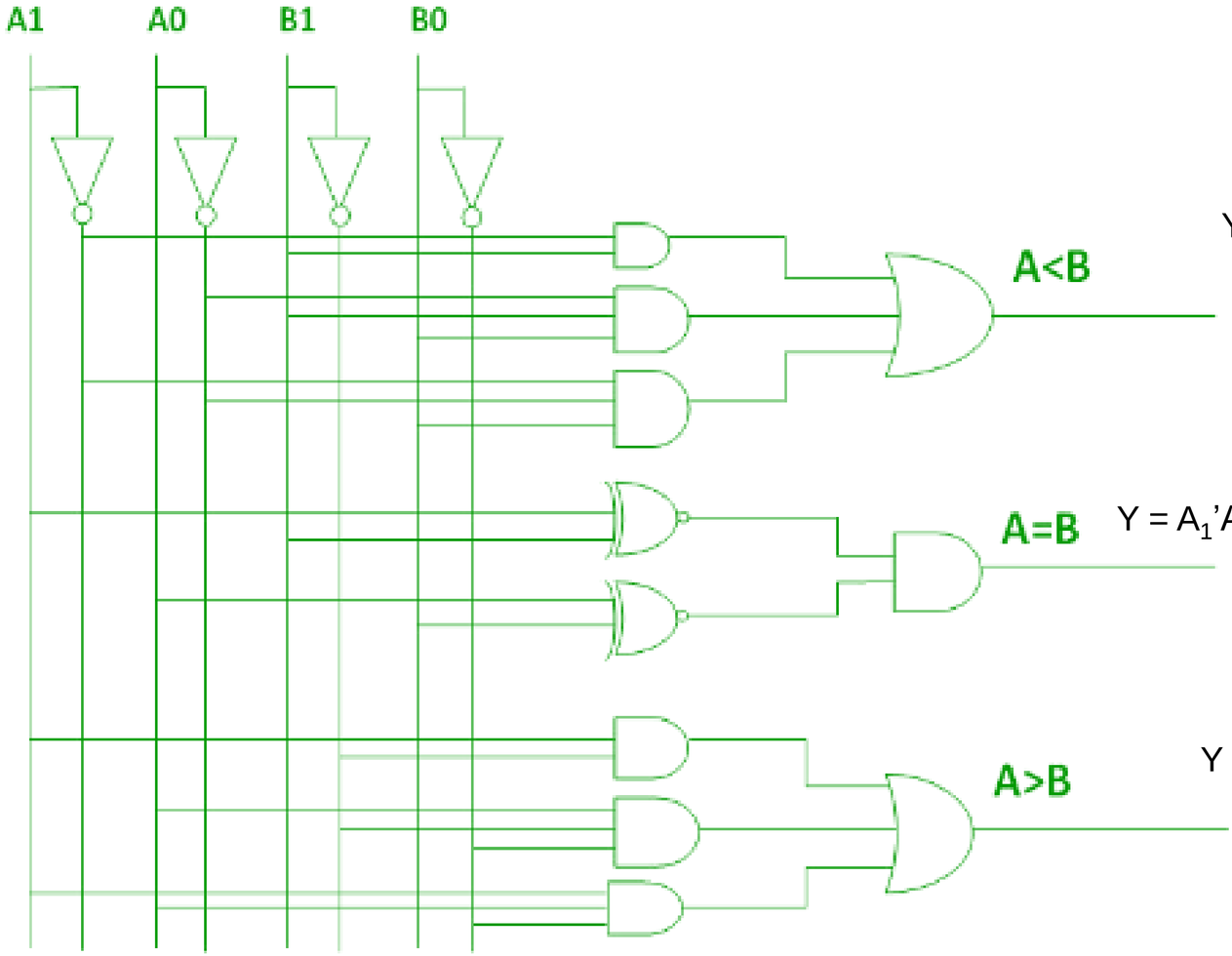
$Y = A_1'A_0'B_1'B_0' + A_1'A_0B_1'B_0 + A_1A_0B_1B_0 + A_1A_0'B_1B_0'$

K Map for A>B



$Y = A_1B_1' + A_0B_1'B_0' + A_1A_0B_0'$

IMPLEMENTATION



$Y = A_1'B_1 + A_1'A_0'B_0 + A_0'B_1B_0$

$Y = A_1'A_0'B_1'B_0' + A_1'A_0B_1'B_0 + A_1A_0B_1B_0 + A_1A_0'B_1B_0'$

$Y = A_1B_1' + A_0B_1'B_0' + A_1A_0B_0'$

APPLICATIONS OF MAGNITUDE COMPARATOR

- Comparators are used in central processing units (CPUs) and microcontrollers (MCUs).

- These are used in control applications in which the binary numbers representing physical variables such as temperature, position, etc. are compared with a reference value.

- Comparators are also used as process controllers and for Servo motor control.

- Used in password verification and biometric applications.

ASSESSMENT QUESTIONS

1. One that is not the outcome of magnitude comparator is _____
   a) a > b
   b) a – b
   c) a < b
   d) a = b

2. If two numbers are not equal then binary variable will be _____
   a) 0
   b) 1
   c) A
   d) B

3. How many inputs are required for a digital comparator?
   a) 1
   b) 2
   c) 3
   d) 4

THANK YOU