



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

16EC231 – DIGITAL ELECTRONICS

II YEAR/ III SEMESTER

UNIT 2 – COMBINATIONAL CIRCUITS

TOPIC - Magnitude Comparator



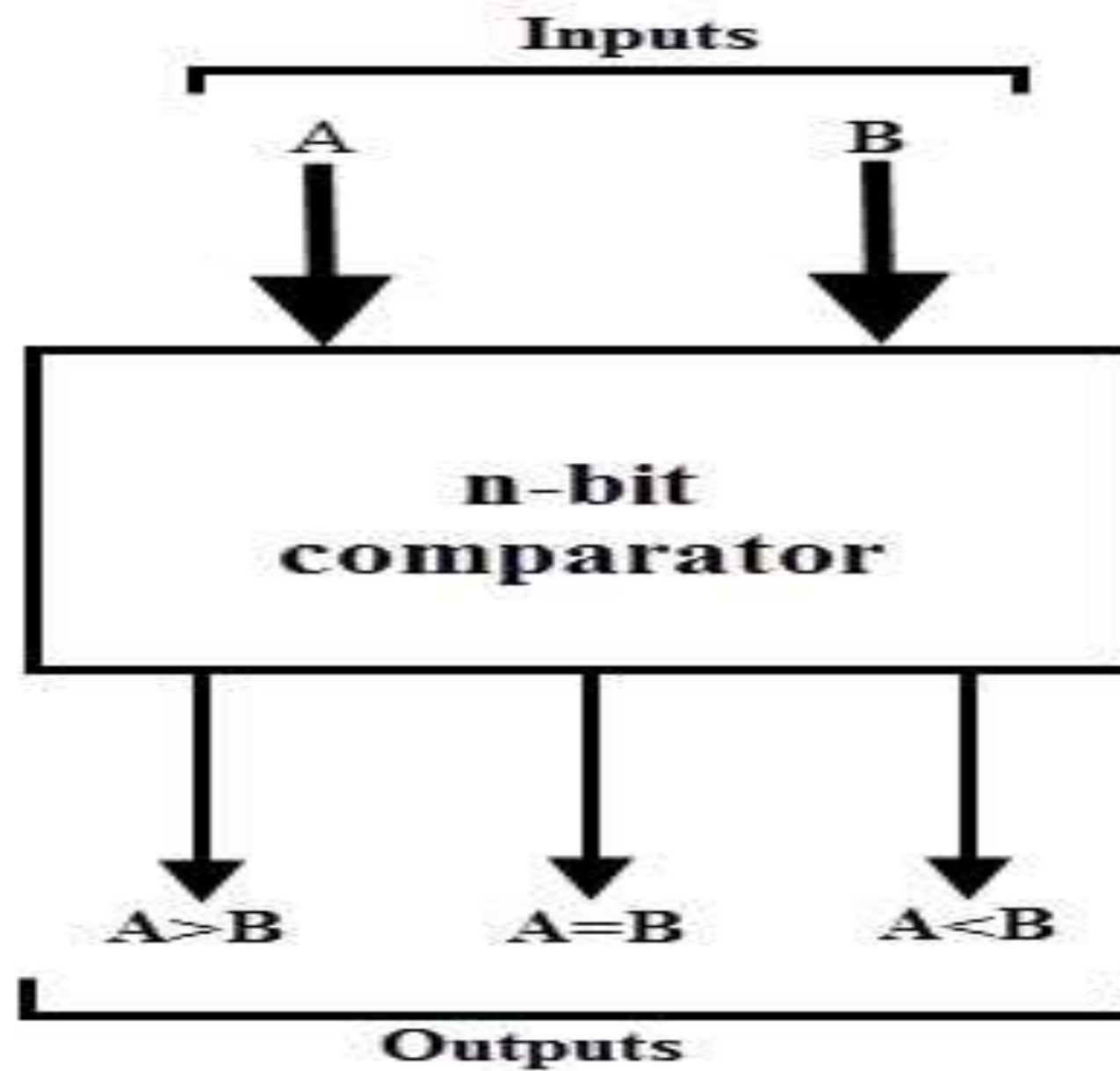
What is a Magnitude Comparator?



A digital comparator or magnitude comparator is a hardware electronic device that takes two numbers as input in binary form and determines whether one number is greater than, less than or equal to the other number. Comparators are used in central processing units and microcontrollers.



Magnitude Comparator





1 Bit Magnitude Comparator



INPUT		OUTPUT		
A	B	$A < B$	$A = B$	$A > B$
0	0	0	1	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0



1 Bit Magnitude Comparator



A \ B	0	1
0		1
1		

$A < B$
 $O/P = A' B$

A \ B	0	1
0	1	1
1		1

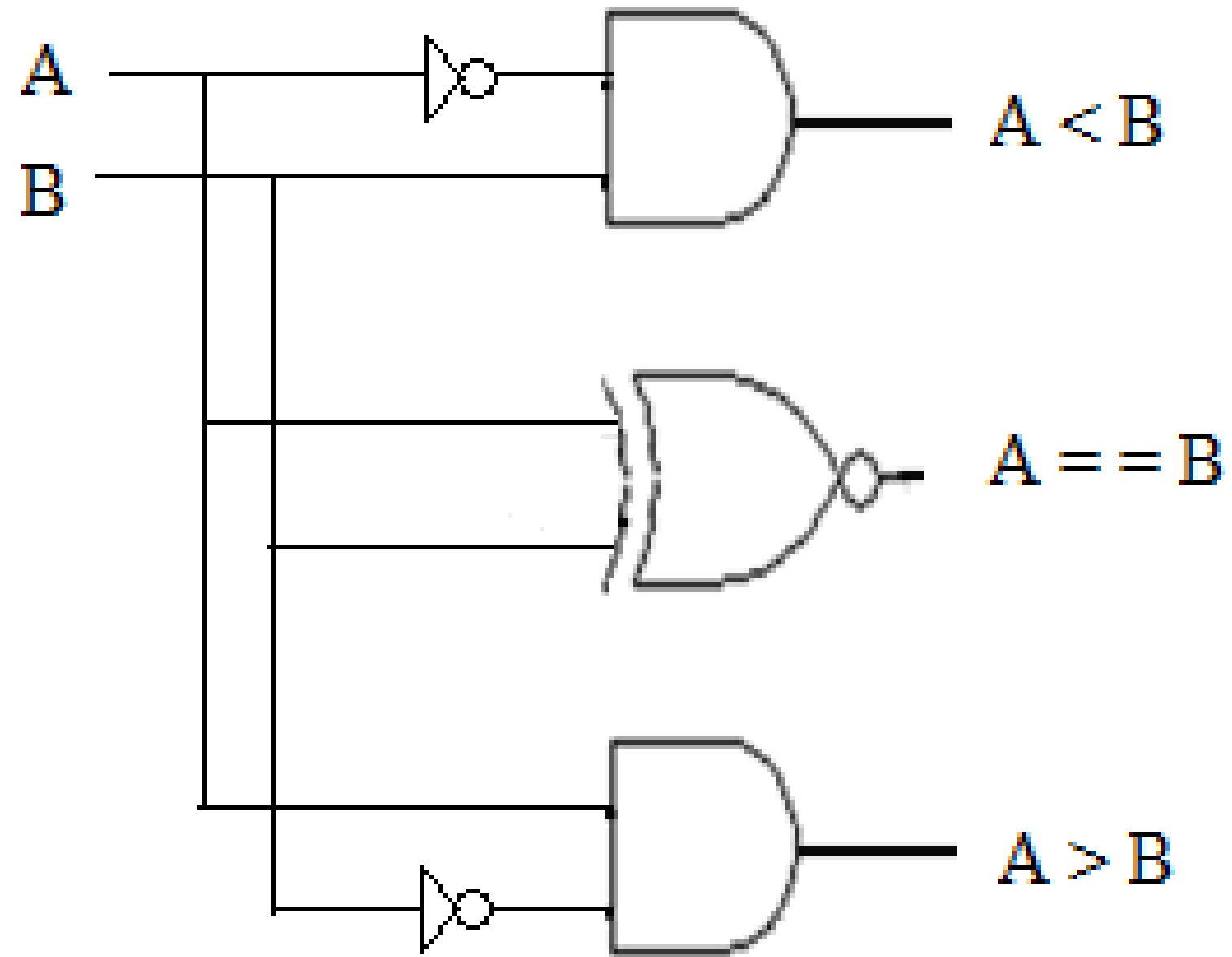
$A = B$
 $O/P = A' B + A B'$
 $= A \oplus B$

A \ B	0	1
0		
1	1	

$A > B$
 $O/P = A B'$



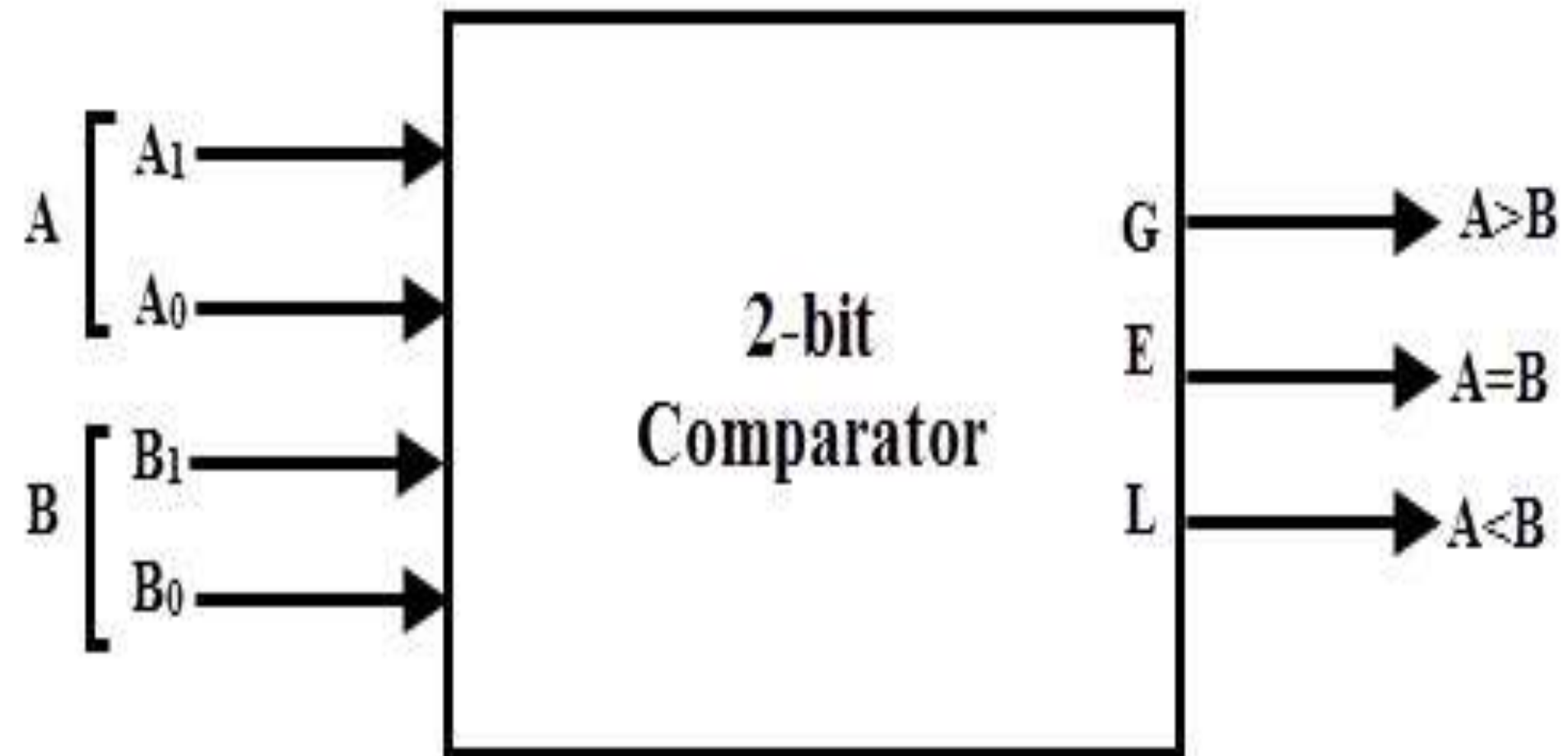
Logical diagram



1-bit magnitude comparator



2 Bit Magnitude Comparator





Truth Table



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



A > B

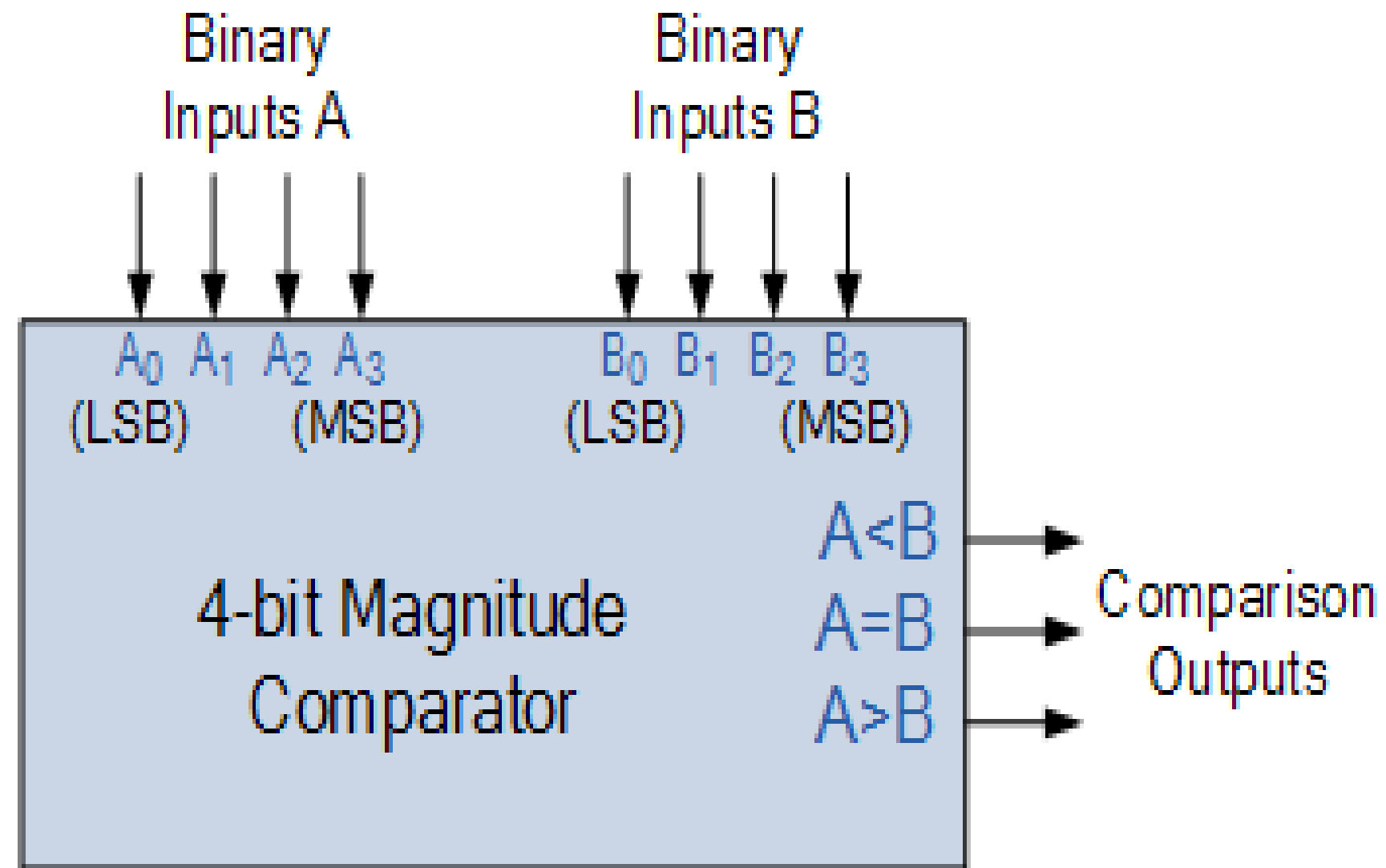
		B1B0			
		00	01	11	10
A1A0	00	0	0	0	0
	01	1	0	0	0
11	1	1	0	1	
00	1	1	0	0	

A = B

		B1B0			
		00	01	11	10
A1A0	00	1	0	0	0
	01	0	1	0	0
11	0	0	1	0	
00	0	0	0	1	



4 Bit Magnitude Comparator





Truth Table



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



Logical diagram

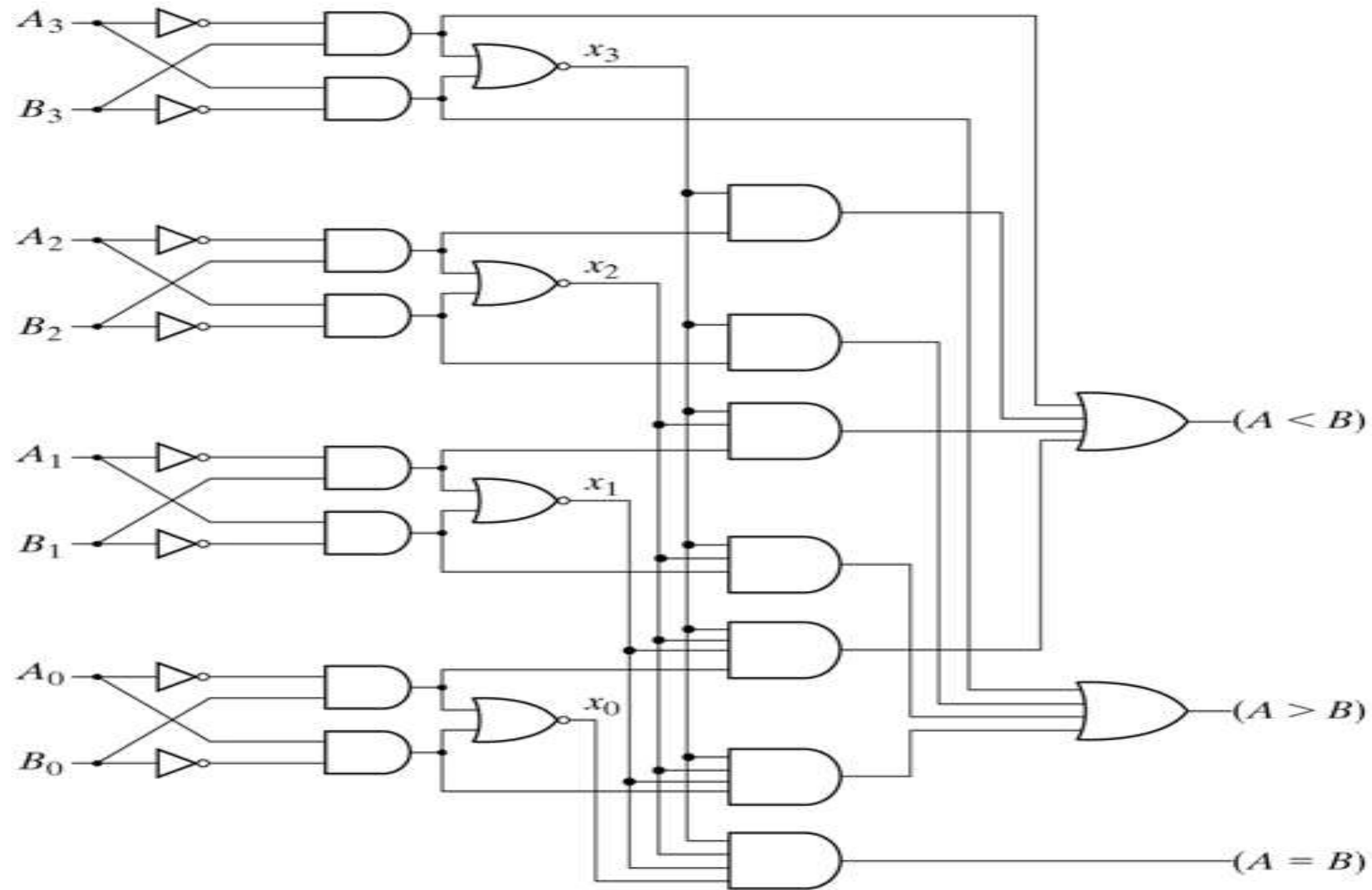


Fig. 4-17 4-Bit Magnitude Comparator



Applications



Applications of Comparators

- These are used in the address decoding circuitry in computers and microprocessor based devices to select a specific input/output device for the storage of data.
- 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. Then the outputs from the comparator are used to drive the actuators so as to make the physical variables closest to the set or reference value.
- Process controllers
- Servo-motor control



ASSESSMENTS



1. What is Comparator?
2. Design 1 bit magnitude comparator.
3. List the applications of comparator.



THANK YOU