



AROR UNIVERSITY
OF ART, ARCHITECTURE,
DESIGN & HERITAGE,
SUKKUR, SINDH

Faculty of Artificial Intelligence & Multimedia Gamming

BS – Artificial Intelligence (Section A and B)

Digital Logic Design Lab

Lab # 08: Comparator

Mr. Abdul Ghafoor

Submission Profile

Name:

Submission date (dd/mm/yy):

Marks obtained:

Comments:

Instructor

Lab Learning Objectives:

Upon successful completion of this experiment, the student will be able:

- To implement 1-bit comparator circuit in the Multisim
- To implement 4-bit comparator using 74HC85/74LS85 IC on **NI ELVIS-II**
- To cascade 2 74HC85/74LS85 ICs to implement 8-bit comparator on **NI ELVIS-II**
- Recognize that comparators can be constructed with logic gates or chips that can be combined if/when the number of bits increases
- Reflect on the similarities and differences between adders and comparators

Lab Hardware and Software Required:

<i>Platform: NI ELVIS III</i>	<p>✓ View User Manual: http://www.ni.com/en-us/support/ model.ni-elvis-iii.html</p> <p>✓ View Tutorials: https://www.youtube.com/playlist ?list=PLvcPIuVaUMIWm8ziaSxv 0gwtshBA2dh_M</p>
<i>Software: NI Multisim 14.0.1 Education Version or newer</i>	<p>✓ Install Multisim: http://www.ni.com/gate/gb/GB_A CADEMICEVALMULTISIM/US</p> <p>✓ View Help: http://www.ni.com/multisim/technical-resources/</p>

Background Theory:

What are Magnitude Comparators?

Inputs		Outputs		
A	B	A>B	A=B	A<B
0	0	0	1	0
1	0	1	0	0
0	1	0	0	1
1	1	0	1	0

Compare word A and word B:

- A=B
- A>B
- A<B

The A=B column is equivalent to an XNOR gate

Figure 1-1 Video. View the video here: <https://youtu.be/BP5G3n9dmYA>



Video Summary

- The A = B column in the truth table is equivalent to an XNOR gate
- Large cascading comparators have 4-bit inputs

In its simplest terms, *comparators* are combinational logic circuits that are used to test whether word A is less than (<), equal to (=) or greater than (>) word B. Comparators that determine whether one value is less than, equal to or greater than another are called magnitude comparators. The truth table for a 1-bit digital *magnitude comparator* can be seen below:

Inputs		Outputs		
A	B	A>B	A=B	A<B
0	0	0	1	0
1	0	1	0	0
0	1	0	0	1
1	1	0	1	0

Figure 1-2 Truth table

Lab Activities 01:

Implement: Building a 1-bit Comparator on Multisim using gates and verify the truth table

- Take a screenshot and include it with your completed lab

Lab Activities 02:

- Implement 4-bit comparator circuit on Multisim
- Take a screenshot and include it with your completed lab