The University of Texas at Dallas
Department of Computer Science
CS 4141: Digital Systems Lab

Experiment #1 – Familiarization with Lab Equipment and Simple AND, OR, NOT, NAND, NOR and XOR Functions

CS 4141 Laboratory 1, PRE-LAB 1

Objective: Become familiar with the behavior of the logic gate operations, how the IDL800a works before starting the main experiment, and how to understand the pinouts on the Integrated Circuit (IC) chips.

Turn-In Checklist

- Participation Quiz (5 points)
- Problem 1. Logic Gate Truth Tables (5 points)
- Problem 2. The Lab Station (5 Points)
- Problem 3. Reading the Integrated Circuit (IC) Chip Pinouts (5 points)

Participation Quiz (5 points)

At the beginning of the semester, a Participation Quiz was announced on Blackboard/e-Learning about the syllabus for this course. The quiz should already have been taken.

Problem 1. Logic Gate Truth Tables (5 points)

Provide individual truth tables for the following logic gates:

- **NOT**
- **AND**
- **OR**
- **NAND**
- **NOR**
- **XOR**

Be sure to correctly label the truth tables and make sure the tables are readable.

Problem 2. The Lab Station (5 points)

Search the document ***IDL800_Notes.pdf*** to answer the following questions.

2.1 Look at the image of the chassis on page 2, on the left side there are a few different power sources: **+V, -5V, -V, +5V, GND**. Which ***sources*** do you use to power and ground an IC (integrated circuit)?
2.2 What are ***bus strips***?
2.3 Why are bus strips useful?

On page 5, there is an image of a breadboard with an IC connected to it. Look at the breadboard this way, we can see each hole denoted by a row letter (**A-J**) and a column number (**1-32**). (If you need hints, read section IV-B, *IC Connections*)

2.4 Is hole **A1** connected to hole **B1**?
2.5 Is hole **A3** connected to hole **A5**?
2.6 Is hole **E5** connected to hole **G5**?
2.7 Is hole **H1** connected to hole **J1**?
2.8 In *Section II. IDL Control Panels* lists all the inputs and outputs of the system. Which ***ONE*** of the following input controls is the ***MOST*** appropriate for Boolean logic (true/false or 0/1 logic): The 3-Way Switch Panel, the Pulse Switch Panel, or the 8-bit Data Switch Panel?

Problem 3. Reading Integrated Circuit (IC) Chip Pinouts (5 points)

Document ***ic_diagrams.pdf*** has the circuit diagrams of the logic gates used in experiment 1. Look at the figures and answer the following questions:

3.1 Is Pin 3 in the **(7400) NAND** chip an input or an output?
3.2 Is Pin 3 in the **(7402) NOR** chip an input or an output?
3.3 Is Pin 11 in the **(7404) NOT** chip an input or an output?
3.4 How many gates are in one **(7408) AND** chip?
3.5 What is pin 7 on the (**7486) XOR** chip?