School of Computing
Computer Science Program

CDA 3101

Introduction to Computer Logic

Lab # 1

Student Name	
Lab Name	**Lab 1 : Logic Circuits**

Lab Checklist	Available Points	Received Points	Information
Printed Schematic	40		See note 7 below
Logic probe demonstration	20		
Required documents	40		Truth table, & Printed lab
Circuit Demo (worked correctly)	Yes / No		Must fully function to receive a grade above zero. Note 1
Date:		
Verified by:		
Final Lab Grade		

Notes for Scoring:

Note 1: A final grade of "0" will be assigned if the circuit demonstration fails to work completely.

Note 2: Lab assignments will not be accepted late.

Note 3: Any assigned quizzes that are associated with this lab will be taken on Canvas unless otherwise noted.

Note 4: All submitted documents from CAD software (ex: Multisim) must contain the student's name and UNF n-number printed via the software (insert text). No name and number; no points!!!!

Note 5: No "print screens" will be accepted from CAD software. Print all documents using the print function within the software.

Note 6: The entire lab assignment must be printed and submitted with any other required documents.

Note 7: Any CAD software can be used to generate a wiring diagram (schematic); however, the software must be approved by the instructor if using anything other than OrCad or Multisim.

Note 8: *A wiring diagram must reflect what is actually built on your hardware trainer. All chip pin numbers, switches, lights, and etc. must be labeled. All input and output signals must be labeled as well as all input and output bit-weights. Do not include any equipment or components that are not used with your lab (ex: logic analyzer).*

Note 9: The lab must be demonstrated and submitted to either a Lab TA or the instructor during a scheduled lab session. Labs will not be graded outside of this time unless authorized by the instructor.

Lab 1: Logic Circuits.

The purpose of this lab is to help the student become the hardware logic trainer, and basic logic circuits. The student will be building circuits to prove the operation of the given logic gates below.

Equipment needed:

> Chips: 7400, 7402, 7404
>   7408, 7432, 7486
> Logic Trainer
> CAD Software

Pre-lab:

A)   Design a system to test logic gates. Design your circuit such that one dual input logic gate will be used from each integrated circuit above. Two logic switches will be connected to all inputs in parallel, and the outputs will be connected to the monitor light indicators (LEDs).

B)   Design another circuit using a dual input AND gate with one input going to a logic switch and the other going to the TTL clock.

C)   *Before you start* building the circuits, use CAD software to create wiring diagrams (schematics) for this lab. <u>Print this diagram prior to building the circuits.</u>   The diagram will also need to be submitted for grading with this assignment.

Using the Hardware Trainer:

Note: *Your prelab material should be complete prior to the lab session!*

A)   Put all 6 chips (integrated circuits) on the breadboard of the logic trainer. Check that the trainer configuration settings should be set for +5V and TTL before turning on the trainer. Make the necessary power connections for the chips.

B)   Verify the operations of all the gates using the switches and monitor lights. Also use the logic probe to determine the output value for unconnected gates.

C)   Create a truth table showing the "expected" and "measured" data. This table will need to be submitted for grading.

D)   Connect the logic probe and use to analyze the circuit operation. Be prepared to demonstrate your ability to properly connect and use the logic probe.

Grading:

A)   Be prepared to demonstrate your working project in class to either a Lab TA or the instructor. <u>You must provide all required documents at the time of inspection or the lab will not be graded.</u>

B)   Submit your printed lab assignment, truth table, and schematics for grading.

Logic Probe Information:

Built-in Logic Probe - Power the logic probe (Red connector to +5 Volts and Black connector to GND). Verify the probe's operation by using the probe wire to check for "live" points on the trainer - locate both logic 0 (green) and logic 1 (red) points. The "mem" feature of the probe is used to detect a pulse signal of too short a duration for the probe's lights to react otherwise. Apply the probe to the trainer's TTL "**clock**" signal to determine the difference between the "**mem**" and "**pulse**" settings.

External Logic Probe - Power the logic probe (Red connector to +5 Volts and Black connector to GND). Verify the probe's operation by using the probe wire to check for "live" points on the trainer - locate both logic 0 (green) and logic 1 (red) points. The "mem" feature of the probe is used to detect a pulse signal of too short a duration for the probe's lights to react otherwise. Apply the probe to the trainer's TTL "**clock**" signal to determine the difference between the "**mem**" and "**pulse**" settings.