EEE 120

Lab 3 Answer Sheet (Online Class)

Registers, Counters and the “Brainless CPU”

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Semester/Year/Session (A/B): Spring 2022 Session A Date: 2/7/22

**Task 3-1: Build and Test a 4-Bit D Register with Enable**

**Include a picture of your Digital circuit here:** ![Diagram

Description automatically generated]()

**Please comment on the single biggest issue you were facing when designing the circuit.**

I had no issues with building this circuit. It took a little longer then expected to get here because I realized I made a mistake in a previous circuit, so I had to go back to find where the error was and correct it.

**Include a picture of your GTKWave waveforms (timing diagram) here:**![Graphical user interface, diagram

Description automatically generated]()

**Did the circuit behave as expected? If no, what was wrong?**

Yes, it behave as expected.

**Please comment on the single biggest issue you were facing when simulating the circuit.**

No issues

**Task 3-2: Build and Test a 4-Bit UP Counter**

**Include a picture of your Digital circuit here:**![Diagram

Description automatically generated]()

**Please comment on the single biggest issue you were facing when designing the circuit.**

No issues

**Did the circuit behave as expected? If no, what was wrong?**

Yes, it behaved as expected

**Please comment on the single biggest issue you were facing when simulating the circuit.**

No issues

**Task 3-3: Create a 4-Bit RAM with 16 4-Bit Words**

**Include a picture of your Digital circuit here:** ![Diagram

Description automatically generated]()

**Please comment on the single biggest issue you were facing when designing the circuit.**

No issues

**Did the circuit behave as expected? If no, what was wrong?**

Yes, it behaved as expected.

**Please comment on the single biggest issue you were facing when simulating the circuit.**

No issues.

**Task 3-4: Build and Test the Brainless Central Processing Unit**

**Include a picture of your Digital circuit here:**![Diagram, schematic

Description automatically generated]()

**Please comment on the single biggest issue you were facing when designing the circuit.**

No issues

**Did the circuit behave as expected? If no, what was wrong?**

Yes, it behaved as expected.

**Please comment on the single biggest issue you were facing when simulating the circuit.**

No issues.

**Task 3-5: Simulate the Brainless Central Processing Unit**

Include a picture of your GTKWave waveforms (timing diagram) here:

**Did the circuit behave as expected? If no, what was wrong?**

No, GTKWave did not work.

**Please comment on the single biggest issue you were facing when simulating the circuit.**

Fixing the program file name module DIG\_RAMDualPort

**Task 3-6: Create Additional Tests**

In order to stay organized, you may use the table here to map out the different values for each test. Repeat this table for each of the additional ALU operations.

|  |  |
| --- | --- |
| **Table 1** | |
| **Operation [ Add operand to Accumulator (ACC) ]** | |
| Control Line | Value |
| data\_in | 0 |
| addr\_bus | Address of operand |
| write | 0 |
| read | 1 |
| acc\_to\_db | 0 |
| load\_acc | 1 |
| pass | 0 |
| invert | 0 |
| arith | 1 |

Include a picture of your Digital circuit here:

Include a picture of your GTKWave waveforms here (one per required test):

**Please comment on the single biggest issue you were facing when designing the circuit.**

GTK Wave did not work

**Did the circuit behave as expected? If no, what was wrong?**

No, I believe the error happened when I edit the files.

**Please comment on the single biggest issue you were facing when simulating the circuit.**

The edited files did not work to open GTKWave.

**Task 3-7: Create a video and submit your report (Optional)**

[This task is useful to get partial credit if your schematic is not working. Take advantage of it to explain to the grader your understanding of the circuit. More importantly, explain where you think the mistake is in and what you would do if you were given more time to fix it.]

Record a short video showing your schematic in Digital and your waveforms in GTKWave. Be sure to show yourself in the video and show your screen. **Upload the video to your Google Drive (personal one or ASU one). Copy and paste the sharing link to that video here. Make sure the link is working and pointing to the correct video. Do NOT upload your video to YouTube.** If your circuit is not working as expected, explain in the video how it is not working and where you expect the mistake to be from.

**Video Link:** <https://drive.google.com/file/d/1lB4IOEorWor8tKvsXmTOyERLLXj8LeqA/view?usp=sharing>

<https://drive.google.com/file/d/1ci7gbfYq5ZMF7O0lPK_Cd4k1kY1ico78/view?usp=sharing>

**At the beginning of your recording, say your name, the task number and circuit name. Be brief in your recording. Submit the completed template to Canvas.**

**Make sure all your files are in the Lab3 directory. Create a zip file of the Lab3 directory. Remember to turn in the zip file and your completed template on Canvas! Make sure you upload the template before the zip file.**

Lab 3: Lab Report Grade Sheet

|  |  |
| --- | --- |
| **Name:** |  |

## Instructor Assessment

|  |  |  |
| --- | --- | --- |
| **Grading Criteria** | **Max Points** | **Points Lost** |
| **Description of Assigned Tasks, Work Performed & Outcomes Met** |  |  |
| Task 3-1: Build and Test a 4-Bit D Register with Enable | 10 |  |
| Task 3-2: Build and Test a 4-Bit UP Counter | 10 |  |
| Task 3-3: Create a 4-Bit RAM with 16 4-Bit Words | 10 |  |
| Task 3-4: Build and Test the Brainless Central Processing Unit | 10 |  |
| Task 3-5: Simulate the Brainless Central Processing Unit | 10 |  |
| Task 3-6: Create Additional Tests | 30 |  |
| Task 3-7: Create a video and submit your report (Optional) |  |  |
|  | **Points Lost** |  |
| **Lab Score (80 points total)** | **Late Lab** |  |
|  | **Lab Score** |  |