# CS 343, Spring 2021

## MIDTERM Lab Project

*Instructor: Professor Izidor Gertner*

***Start Date April 7, 2021 Time 12:00 -1:40 PM***

***Due Date April 9, 2021 Time 11:59PM***

***This is individual test project.***

Please hand write and sign statements affirming that you will not cheat:

*"I will neither give nor receive unauthorized assistance on this exam.*

*I will use only one computing device to perform this test"*

Please hand write and sign here:

- # Assignment 1 based on Tutorial

  "Laboratory Exercise Tutorial Memory blocks using VHDL array and LPM modules." DESIGN MEMORY AS A VHDL ARRAY AS SHOWN IN PART III, and using LPM SRAM modules.

  - **Design 32 bit word Data Memory module based on LPM tutorial attached. Data memory size 16 words.**
  - **Design 32 bit word INSTRUCTION Memory module based on LPM tutorial attached. Instruction memory size 32 words.**
  - **Design 32 bit register DUAL PORTED REGISTER FILE module based on 2-port RAM LPM tutorial attached. EACH register is 32 bits.**

- **What to submit:**
- ***1 Report should include VHDL code, waveform in simulation, as you did in self check labs, please include explanation on how did you get the screenshots.***
- ***2. Verification using ModelSim , (waveforms),***
  - ***You have to enter 5 32 bit words to data memory* USING MIF FILE *and demonstrated this using waveforms.***
  - ***You have to enter 5 32 bit MIPS instructions( you can take instructions from MIPS using MARS) to instruction memory and demonstrated this using waveforms. You have to enter 3 32 bit words to register file. YOU HAVE TO DEMONSTRATE HOW DO YOU READ 2 WORDS and WRITE 1 word to REGISTER FILE in SIMULATION.***

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- *3.. Archived Project files with readme*

- **Assignment 2 based on Intel AP note**

  "USING LIBRARY MODULES IN VHDL DESIGNS"

**Design 32 bit ADD/SUB unit as described in the second attached tutorial.**

**You have to create two versions:**

- **From scratch and**
- **Another one using LPM modules.**
- **You have to load data to ADD/SUB unit from DATA memory (just copy NOT TO USE LOAD INSTRUCTION) USE MIF file to load data to memory.**
- **You have to design circuit to output N – negative flag, Z- zero flag, O -overflow flag.**
- **Demonstrate operation using waveforms.**
- **Demonstration of ACCUMULATOR unit for ADD and for SUB.**