CSE341 – Digital Logic Design

Project

Project Description

It is required to implement a digital circuit for a 4-bits ALU (arithmetic and Logic Unit) using TTL IC's.

ALU Inputs	ALU Outputs
1. Operands A, B: Each of them is 4 bits. **2. Control Lines M, S_1 and S_0:** Used to select the required Operation. **3. CarryIn:** 1-bit used for Some of Arithmetic Operations.	**1. Result F:** 4 bits. 2. **CarryOut**: 1-bit used for Some of Arithmetic Operations

The function table of the ALU:

M=0 (Logic Mode)			M=1 (Arithmetic Mode)		
S_1	S_0	Function	S_1	S_0	Function
0	0	F=0	0	0	F=A plus B
0	1	F=A or B	0	1	F=A minus B
1	0	F=A and B	1	0	F=A plus 1
1	1	F=not A	1	1	F= Negative A

Design Hint

- You start by designing 1-bit ALU slice and then cascade 4 copies with aid of CarryIn and CarryOut for each slice.
- In the slice Design:
    - Design each operation separately and use multiplexer to help in selection of the operation based on control lines.
    - For arithmetic operations, use single Full Adder for all operations and make use of multiplexer on its inputs to get all operations.

Deliverables:

- Initial Report (By Email to TA and Lecturer): Problem Statement, Design, Implementation Details, Testing Plan, Circuit Limitation and Future Work, References. Due Date: Saturday December 12th , 2015
- Circuit implemented using chips and wires in neat connections on a breadboard. It should be tested. Due Date: Saturday December 26th, 2015.
- Final Presentation for the Project: Due Date: Saturday December 26th, 2015.

General Notes:

- The Power Supply for the ALU Circuit is designed in Course of Electronics Design. Circuits is first tested using standard Power Supply and then tested using your designed power supply. Passing the test using standard power supply is 80% of the marks and passing the designed power supply is 20% of the marks.
- Groups: The same groups working in Power Supply Project in Electronics Design Course.
- Assume Any Missing Details.
- Any Minor Changes in Requirements are accepted.