CEC Robotics

Name:____________________________________
Date:____________

Circuit Lab 10 – 4-Bit Adder

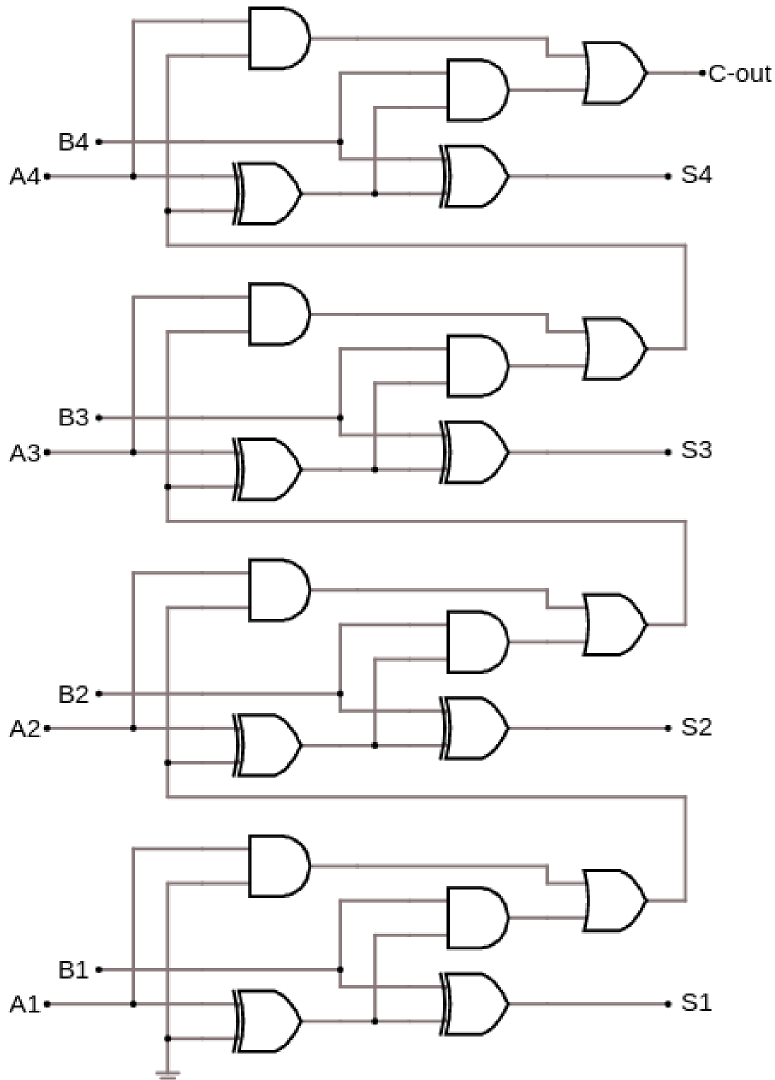
Required Equipment and Supplies

- Circuit Simulator (software)
- Resistors: 22kΩ (8), 1.8kΩ (5)
- ICs: 7483 4-Bit Adder DIP-16 (1)
- DIP Switch Module - 4 Position (2)
- Indicator LEDs (5)
- Bench-top DC power supply
- Breadboard
- Cables and 22ga wire as needed

Part I. 4-Bit Adder Logic Simulation

Build the following logic circuit in a simulator, then test the arithmetic logic.

Note: It is quickest to build a two bit full-adder, then copy/paste and connect the carry outputs to carry inputs.



1a.

A1	0	**B1**	0	**S1**	
A2	1	**B2**	0	**S2**	
A3	0	**B3**	1	**S3**	
A4	1	**B4**	1	**S4**	
				C-out	

(convert to decimal) and check A + B = S*

2a.

A1	1	**B1**	0	**S1**	
A2	0	**B2**	0	**S2**	
A3	1	**B3**	1	**S3**	
A4	1	**B4**	0	**S4**	
				C-out	

(convert to decimal) and check A + B = S*

3c.

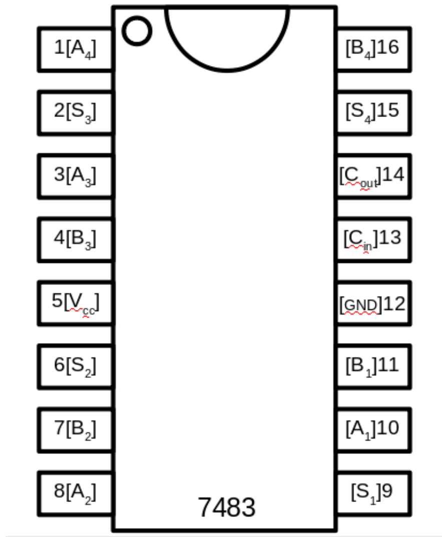
A1	1	**B1**	1	**S1**	
A2	0	**B2**	1	**S2**	
A3	1	**B3**	1	**S3**	
A4	0	**B4**	1	**S4**	
				C-out	

(convert to decimal) and check A + B = S*

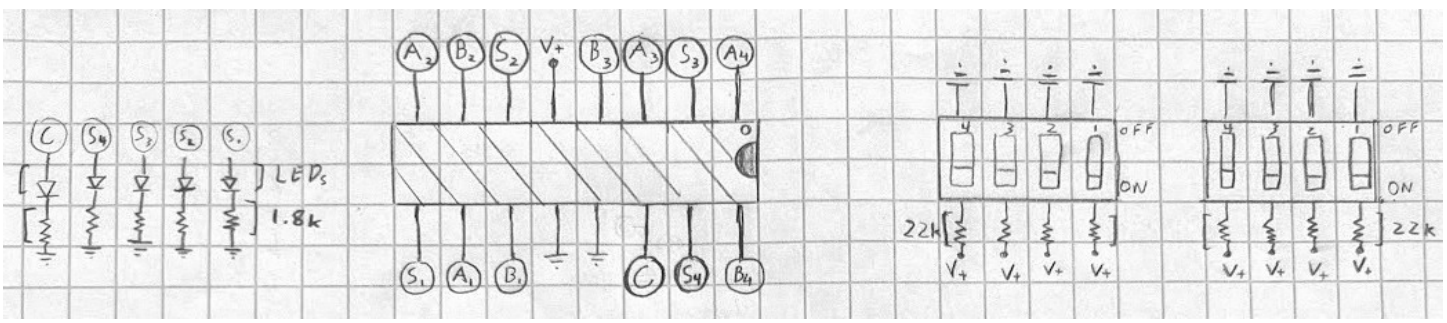
***note the carry bit.**

Part II. Testing a 4-Bit Adder IC

Wire the 7483 4-Bit Adder IC in a DIP-16 package to test the outputs from part **I** in physical circuit. The pin configuration of the 7483 DIP-16 is described below.



Use a 4-pin DIP Switch to represent the 4 A bits and the 4 B bits. The Sum and Carry bits will be visible as LEDs that are illuminated for a ‘1’, and off for a ‘0’. To verify that the circuit is functional, try each input combination from **I.a**, **I.b**, and **I.c**. You should get identical results to the simulator when your circuit is working properly.



<u>Notes about the above wiring scheme:</u>

- Values will be read such that the **least significant bit** is the **farthest right** on both the input switches and output lights.

- The **DIP Switch** modules are **upside down** *on purpose*:
  A binary **1** corresponds to the **UP** position (switch **OFF**).
  A binary **0** corresponds to the **DOWN** position (switch **ON**).