King Saud University
College of Computer and Information Sciences
Department of Computer Science

CSC 220: Computer Organization

Lab Project

Due Date: Sunday 7 April

Project Description: The aim of this project is to design the 4-bit Function Unit Combining Arithmetic Logic Unit (ALU) and a Shifter that can perform the operations given in table 1 below.

a. Use X and Y as 4 bits input and F as 4 bits output as shown in Figure 1.
b. S0,S1,S2 and S3 represent the selction code in the operation set table
c. Three statue bits V (over flow), C (carry), N (negative) and are related to arrithmatic operations and statue bit Z (zero) is relataed to both arrithmatic and logic operation.
d. Test your designed Function Unit with necessary tables.

Marking: Total marks for the project is five (5). Each student needs to submit the project and demonestrate it individually.

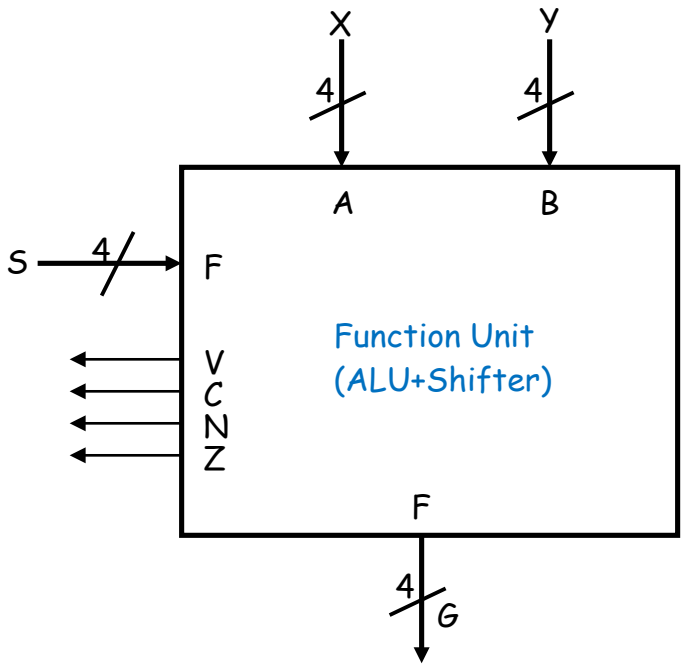

Figure 1: Block diagram of 4-bit Function Unit

Table1 : Set of operations

S3	S2	S1	S0	Operation
0	0	0	0	G=X
0	0	0	1	G=X+1
0	0	1	0	G=2*X
0	0	1	1	G=2*X+1
0	1	0	0	G=X+Y'
0	1	0	1	G=X+Y'+1
0	1	1	0	G=X-1
0	1	1	1	G=X
1	0	0	0	G=X AND Y
1	0	0	1	G=X XOR Y
1	0	1	0	G=X OR Y
1	0	1	1	G=X'
1	1	0	0	G=Y'
1	1	0	1	G= Logical Shift left X
1	1	1	0	G=Y
1	1	1	1	G=Rotate Shift Right Y

Submission: (Upload your project on LMS before Sunday 7 April -11:59 p.m)

You need to submit the following:

1. Your circuit in logisim file.
2. A pdf file contains: A screen shot of your circuit and test cases for each operation. In each case you need to specify the value of S, X and Y with the corresponding output as following:

Input				Operation	Input		Expected output				
S_3	S_2	S_1	S_0		X	Y	G	C	V	N	Z
0	1	0	0	G=X+Y'	0001	0010	1110	0	1	1	0
0	1	0	0		1010	1001	0000	1	1	0	1

Submission instructions:

1. Put your files (circute + PDF) in one folder.
2. Name the folder as: your name_LABInstructor.
3. Compress the folder and upload it.