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

CSC 220: Computer Organization

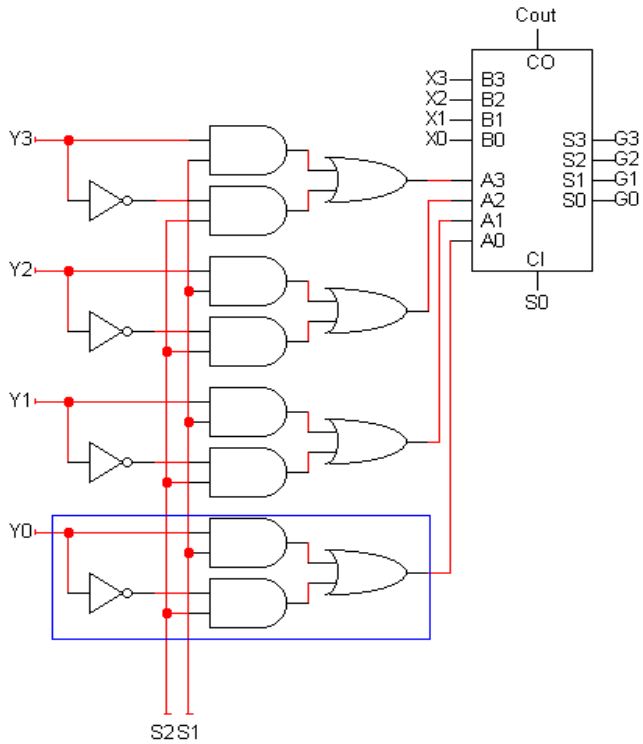
Tutorial 10: ALU

Q1: MCQ

i. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, "numbers are represented in HEX and in 2's complement", what is the contents of R1 in Hex if the instruction R1 <-- R2+R4 is executed?
[A] FF [B] 7F [C] 60 [D] 6E

ii. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of overflow Flag "V" and Zero Flag "Z" and Carry "C' if the instruction R1 <-- R2 + R4 is executed?
[A] V = 1, Z = 1, C=0 [B] V = 1, Z = 0 , C =1 [C] V = 0, Z = 1, C = 0 [D] V = 0, Z = 0, C=1

Q2. Fig1 (a) below show the design of Arithmetic unit of 4-bits, Fill the function table in Fig1(b).



S_2	S_1	S_0	Operation
0	0	0	G = X
0	0	1	G =
0	1	0	G =
0	1	1	G =
1	0	0	G =
1	0	1	G =
1	1	0	G =
1	1	1	G =

Fig1 (a) **Fig1 (b)**

Q3: Analyze the following circuit and fill in the accompanied table to show its operations.

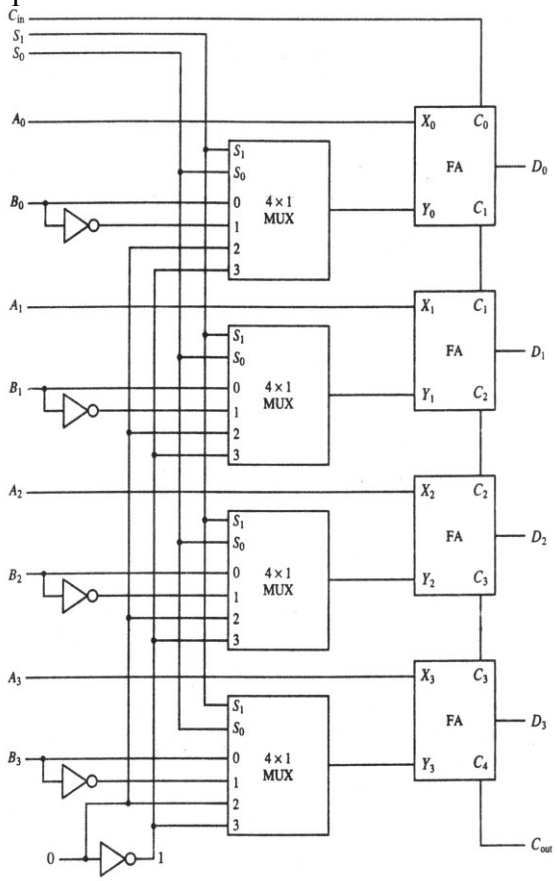


Figure 4-9 4-bit arithmetic circuit.

Select			Input	Output
S_1	S_0	C_{in}	Y	$D = A + Y + C_{in}$
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Q4: Show how to construct a Combinational Shifter that can perform the following operations.

S1 S0	Operations
0 0	Transfer
0 1	Right shift
1 0	Left shift
1 1	Unused

Home Works

Text book problems: 8-1 to 8.7

Additional Problems

1. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of overflow Flag "V" and Zero Flag "Z" if the instruction R1 <-- R1 + R4 is executed?
[A] V = 1, Z = 1 [B] V = 1, Z = 0 [C] V = 0, Z = 1 [D] V = 0, Z = 0

2. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of R1 in decimal, if the instruction R1 <-- R1 + R4 is executed?
[A] 49 [B] 50 [C] 51 [E] 52

3. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of overflow Flag "V" and Zero Flag "Z" and Carry "C' if the instruction R1 <-- R1 - R4 is executed?
[A] V = 0, Z = 0, C=0 [B] V = 1, Z = 0 , C =1 [C] V = 0, Z = 1, C = 0 [ED] V = 0, Z = 0, C=1

4. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of R1, if the instruction R1 <-- R1 - R4 is executed?
[A] R1= CF [B] R1= FC [C] R1= 00 [E] R1= FF
0, C=1

5. Assuming registers are 8-bits width, and R1 = CE, R2 = 6F, R3 = 9F, R4 = FF, ""numbers are represented in HEX and in 2's complement" what is the contents of overflow Flag "V" and Zero Flag "Z" and Carry "C' if the instruction R1 <-- R1 + R3 is executed?
[A] V = 0, Z = 0, C=0 [B] V = 1, Z = 0 , C =1 [C] V = 0, Z = 1, C = 0 [E] V = 0, Z = 0, C=1