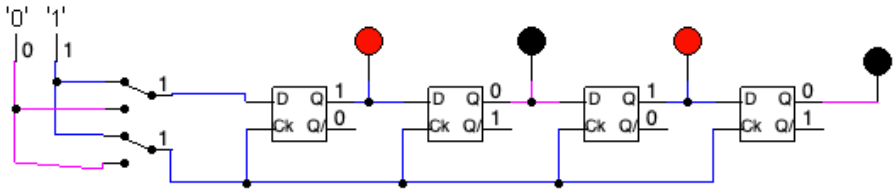
Instruction:

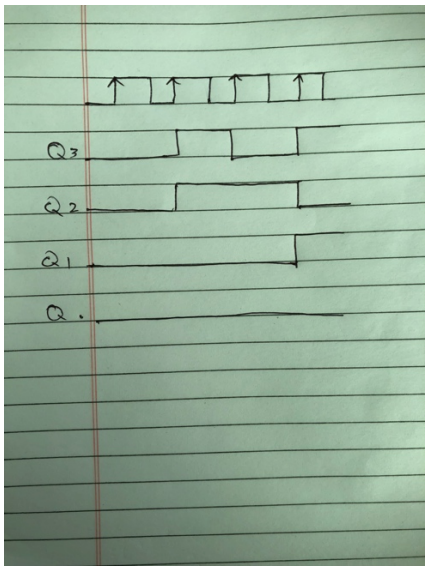
Complete all questions in **2 hour.**

1. Construct 4 bit Serial In parallel Out shift register using D- flip flop. Explain the Working mechanism of the circuit taking Serial input 1010. Also draw the timing diagram according to the given input.

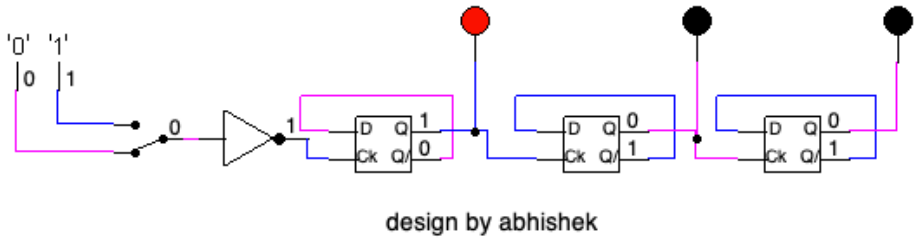


clock	Input	Q3	Q2	Q1	Q0
^	intial	0	0	0	0
^	0	0	0	0	0
^	1	1	0	0	0
^	0	0	1	0	0
^	1	1	0	1	0

Timing diagram

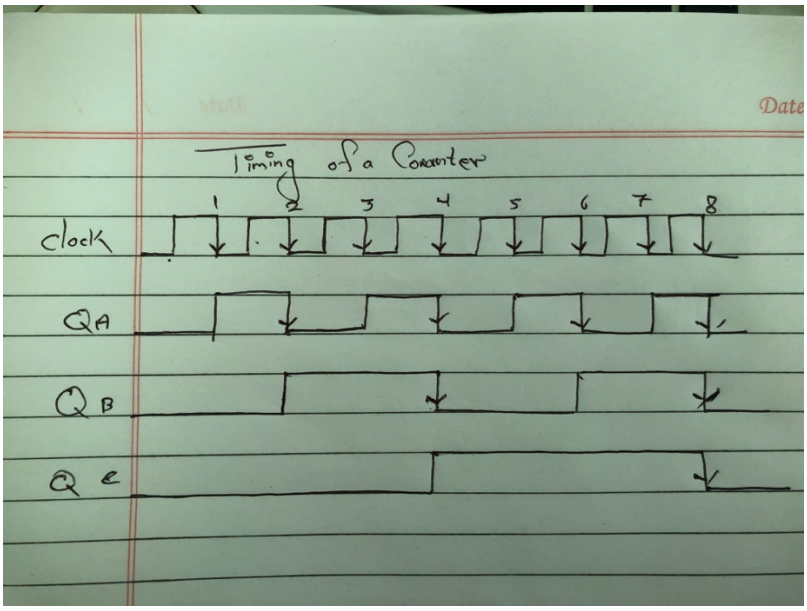


2. Design a 3 bit counter using Toggle D flip flop and draw the timing diagram.

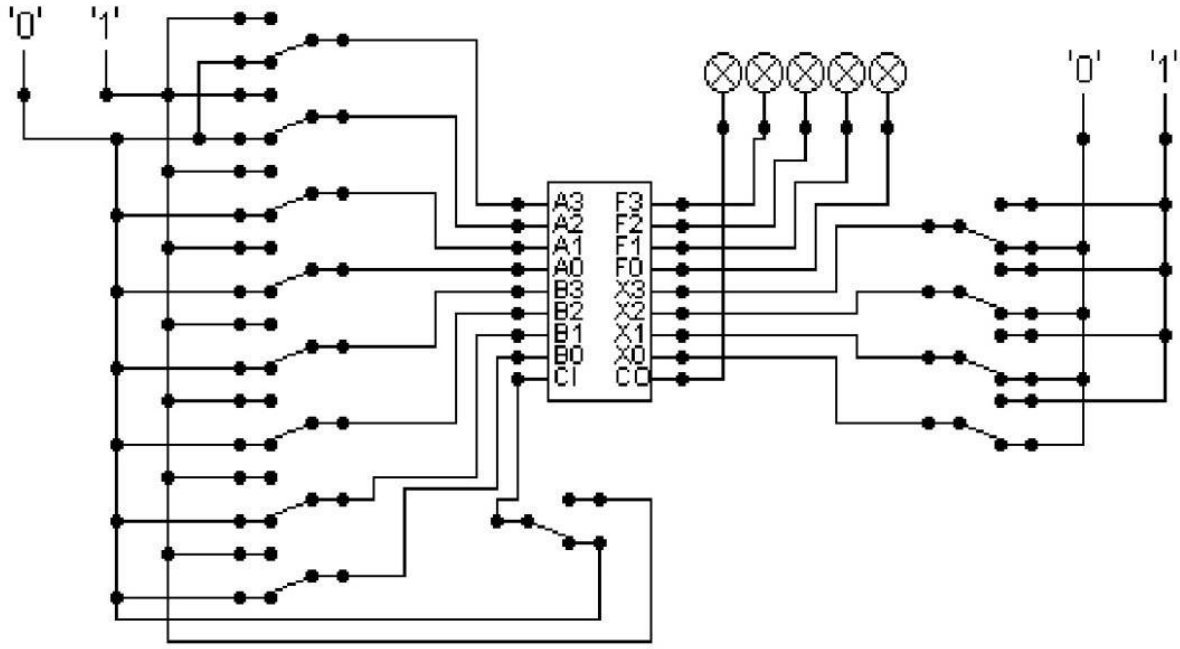


CLOCK TRASITION	Q2	Q1	Q0
O	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	0
6	1	1	0
7	1	1	1

Timing diagram



3. Load alu.cct file from the logsim folder. The circuit should look like this

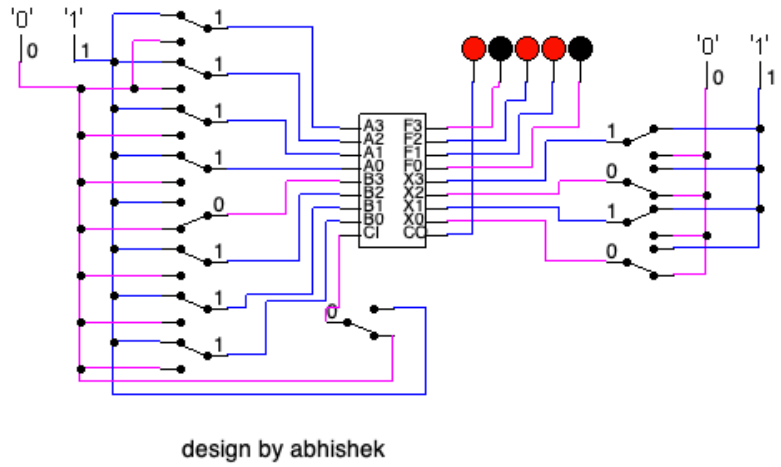


The circuit behaves like a simple arithmetic logic unit. The inputs A0-A3 represent a 4 bit binary number. Inputs B0-B3 represent another binary number. A0 and B0 are the least significant bits respectively. The following table details the functions supported by the chip. All other control lines = 0.

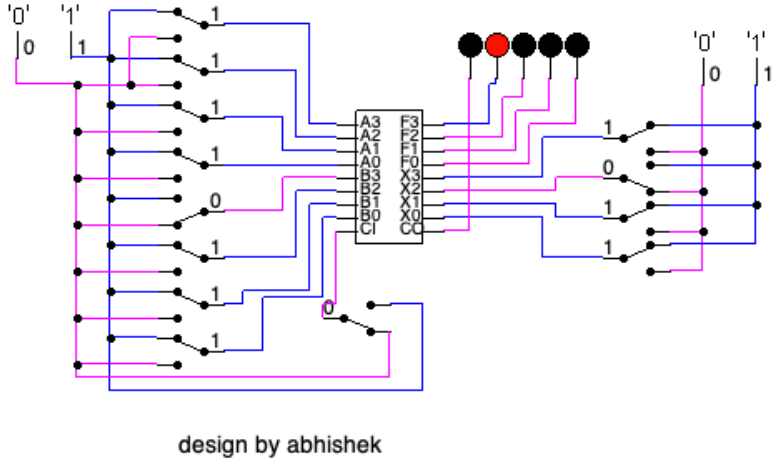
Function	Add	Subtract
X3-X0	1010	1011

i.Use A= 15 and B = 7

Add= 22

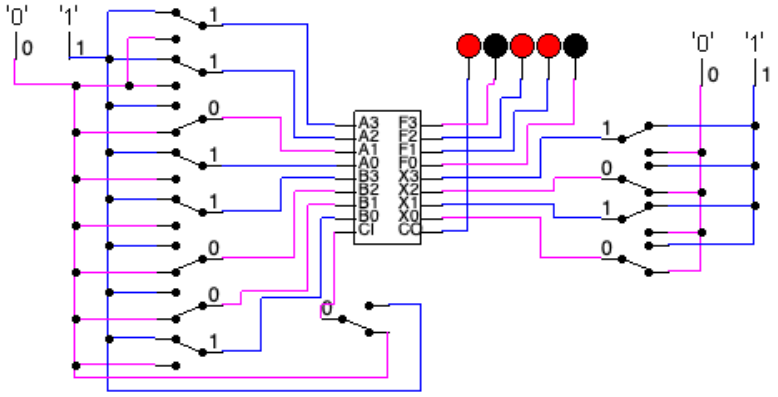


Sub= 8



ii.Use A = 13 and B = 9

Add= 22



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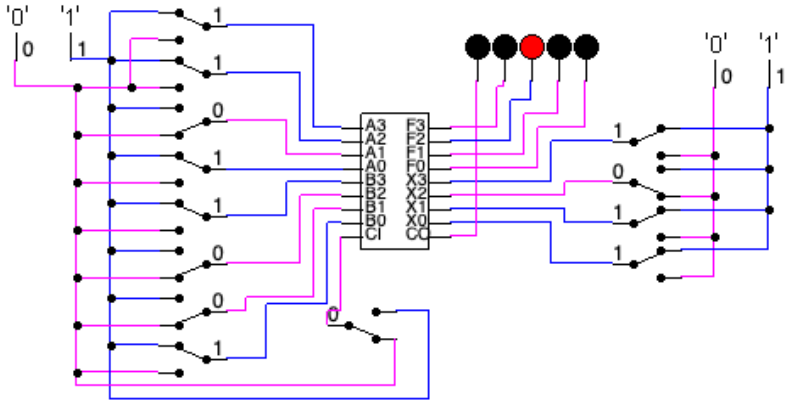
Sub= 4



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