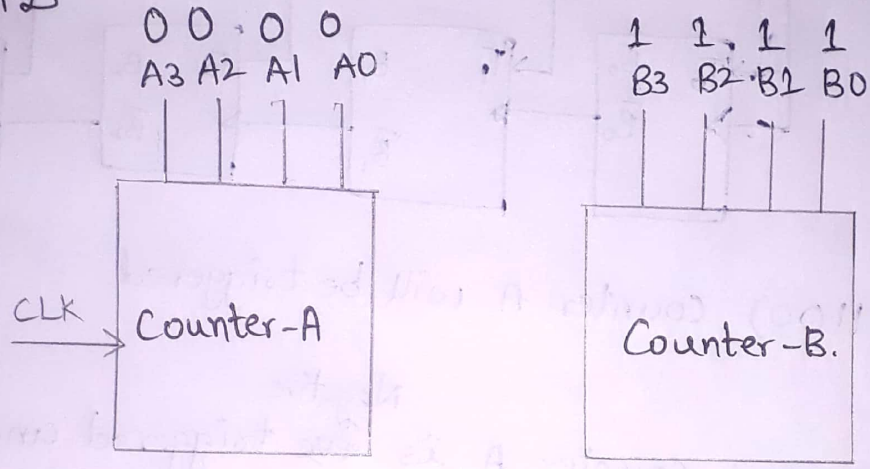
Assignment.

There are: 2 Counters, "Counter-A" being asynchronous up counter & "Counter-B" is an asynchronous down counter and at T=0, 0000 & 1111 are loaded respectively as shown. clock source (CLK) available is 1MHz

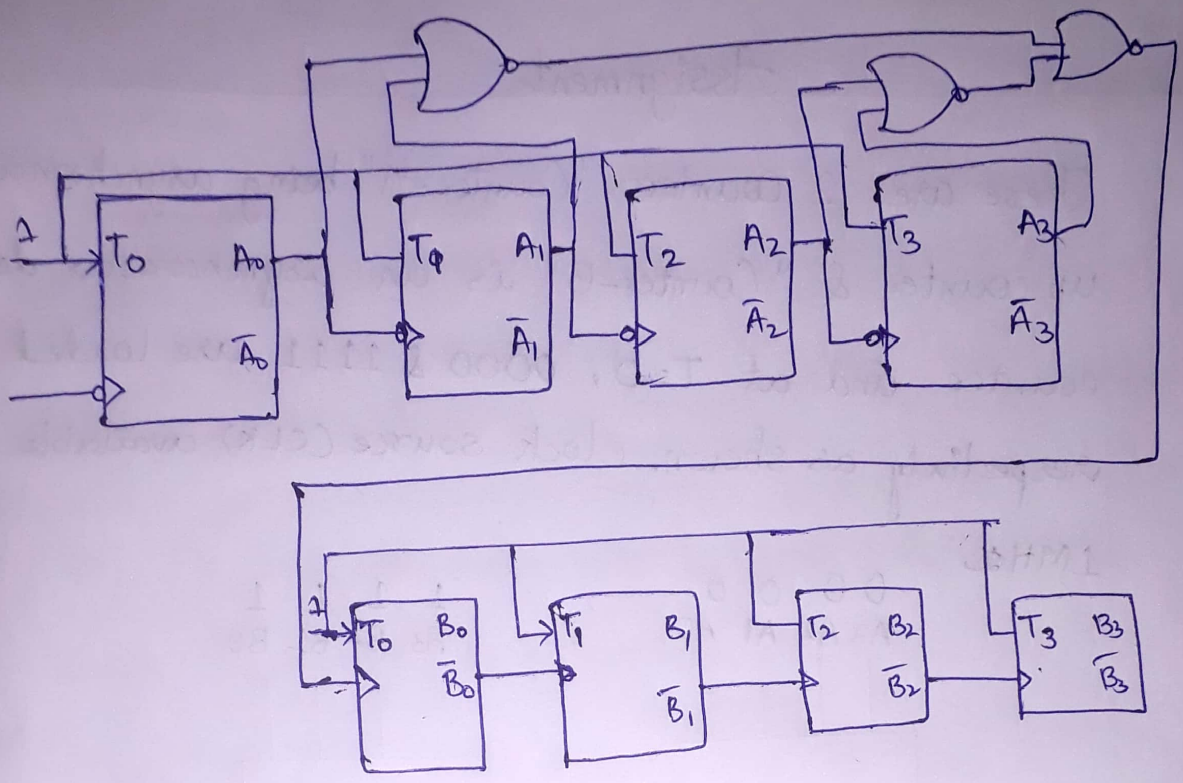


1. Complete the design such that Counter B decrements by One value each time when decimal "12" appears at output of Counter A (A0 being LSB)?

a) Find the no. of flipflops required

$$\log_2 16 = 4$$

b) Consider any type of flipflop here I am considering T- flipflop.



At 12 (1100) counter A will be triggered

The asynchronous counter A is ~~the~~ Negative triggered and asynchronous counter B is positive triggered.

So when counter A is 1100 at the time counter B will triggers.

2. What is the decimal value at outputs of both Counter A & Counter B at T=0.2 milliseconds?

$\Rightarrow$ 0.2 milliseconds $\Rightarrow$ 200μs

The clock ~~pulse~~ source of counters is 1MHz = 1μs

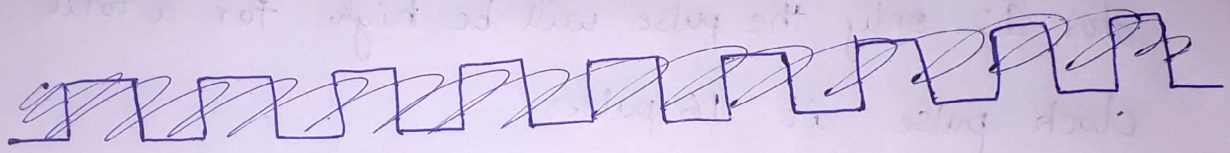
For 16 clock pulses = $\frac{200}{16}$

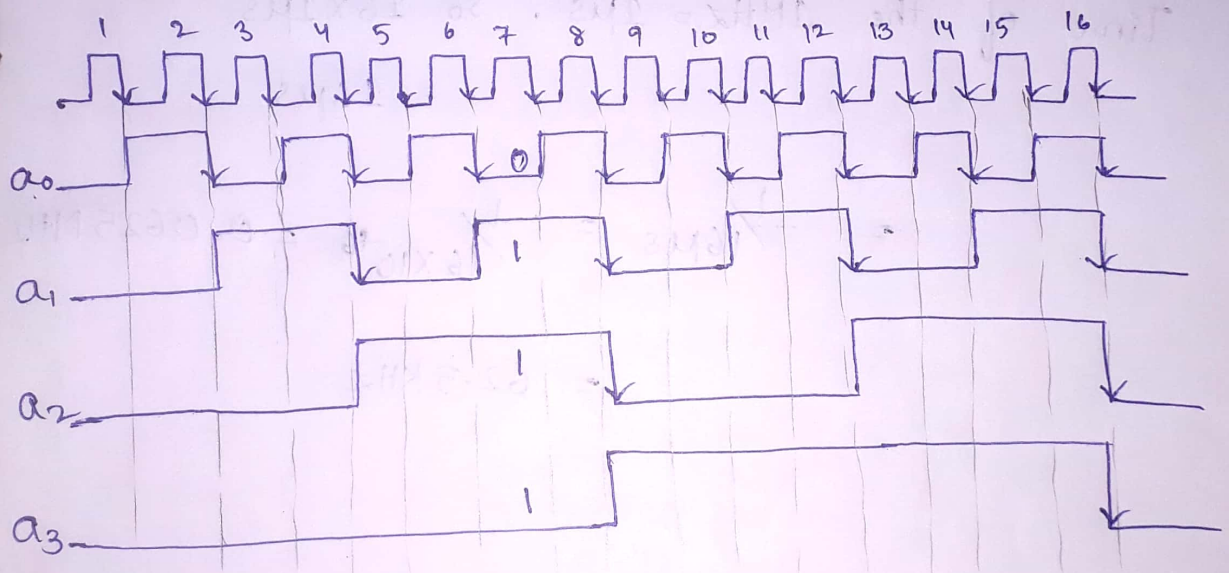
approximately $\Rightarrow$ 12.

...it remains = 8

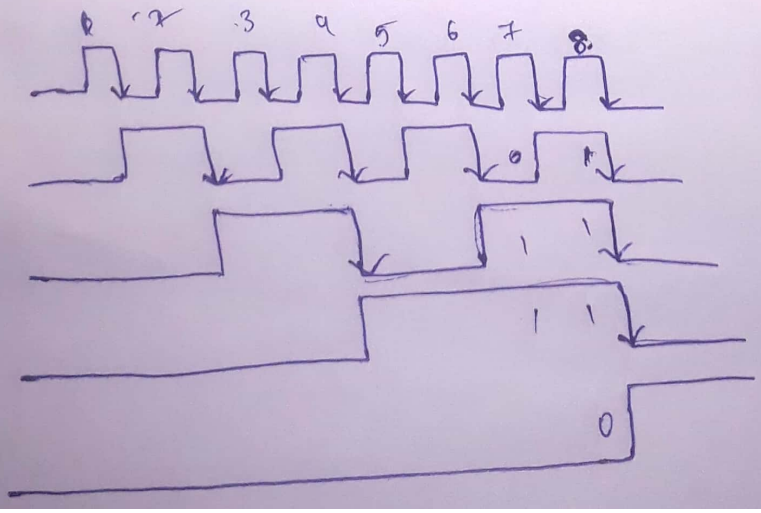
approximately Counter B repeats 12 times. So In counter B when a value decrements 12 times then it is equal 0011 (3)

The counter A is a up counter so the decimal value of that 7 (0111)

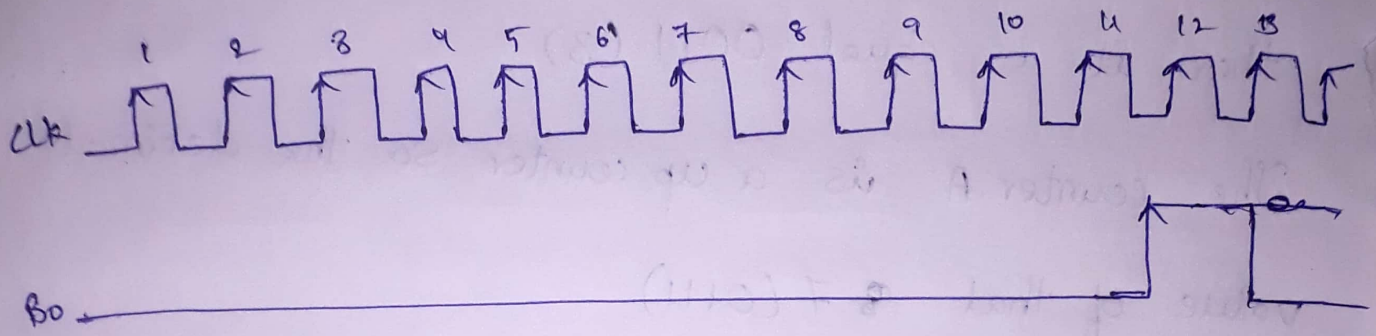




Clock pulses of Counter A



3. What is the frequency of B0 with respect to CLK (1MHz)?



For 12 only the pulse will be high for a total clock pulse it 16 pulses

Time of the 1MHz = 1μs. So 16 x 1μs

= 16μs

= $1/16\mu s = 1/16 \times 10^{-6} = 0.0625$ MHz

= 62.5 KHz