Group 18 - E/20/054
E/20/055

CO321 - Lab3

Ex1

Prescaler = 8 → $T_{counter\_clock} = \frac{8}{16}\ \mu s$

$= 0.5\ \mu s$

Counter increments needed $= \frac{4\ ms}{0.5\ \mu s} = 4000$ steps

Too large → Timer 0 can only go upto 256

Prescaler = 64 → $T_{counter\_clock} = \frac{64}{16}\ \mu s$

$= 4\ \mu s$

Counter increments needed $= \frac{2ms}{4\ \mu s} = 500$

Still too large

Prescaler = 256 → $T_{counter\_clock} = \frac{256}{16}\ \mu s$

$= 16\ \mu s$

Counter increments needed $= \frac{2ms}{16\ \mu s} = 125$

This is within the range of Timer 0 (<255)

Ex 2

∴ Initial counter value = 255+1 - 125 = 131

Assuming same prescaler of 256

Counter increments needed $= \frac{500ms}{16\ \mu s} = 31250$

∴ Timer 0 cannot be used. We can either

- We can increase prescaler
- switch to timer 1

Option 1

$T_{counter\_clock} = \frac{1024}{16}\ \mu s = 64\ \mu s$

Counter increments $= \frac{500ms}{64} = 7812.5$ steps

This greater than the range of Timer 0

∴ Only option 2 is viable

Ex 3

Highest counter value (Prescaler = 1024) = $\frac{1024}{16}$ = 64 μs

Max possible steps in Timer 0 = 255

∴ Highest possible countable time = 64 × 255 = 16.32 ms

Ex 4

Tcounter clock (Prescalar 1024) = $\frac{1024}{16}$ = 64 μs

Counter increments = $\frac{1\,s}{64\,\mu s}$ = 15625

Initial value = 65536 − 15625 = 49911

Ex 5

Highest possible countable time for timer 0 = 16.32 ms

∴ To reach 100 ms → $\frac{100}{16.32} \simeq 6.1$

∴ 6 overflows

If → 6 × 16.32 = 98.3 ms

If → 7 × 16.32 = 114.7 ms

Ex

For timer 0

Highest possible countable time = 16.32

∴ To get to 50ms → 3 overflows

For timer 1

$T_{counter\_clock} = 64\ \mu s$

$$\text{Number of increments} = \frac{500\ ms}{64\ \mu s} = 7812.5$$

∴ Initial counter value $= 65536 - 7813$

$= 57723$