

### Derivation of initial counter value for 1s delay in TIMER1

$$\begin{aligned} \text{XTAL} = 16\text{MHz} &\rightarrow T_{\text{xtal\_clock}} = 1/16 \text{ us} \\ \text{Prescaler} = 1:1024 &\rightarrow T_{\text{counter\_clock}} = 1024 \times (1/16) \text{ us} \\ &= 64\text{us} \\ \text{Number of increments} &= 1,000,000\text{us}/64\text{us} \\ &= 15625 \\ \text{Initial count} &= 65536 - 15625 \\ &= 49911 \end{aligned}$$

### Derivation of initial counter value for 1ms delay in TIMERO

$$\begin{aligned} \text{XTAL} = 16\text{MHz} &\rightarrow T_{\text{xtal\_clock}} = 1/16 \text{ us} \\ \text{Prescaler} = 1:64 &\rightarrow T_{\text{counter\_clock}} = 64 \times (1/16) \text{ us} \\ &= 4\text{us} \\ \text{Number of increments} &= 1,000\text{us}/4\text{us} \\ &= 250 \\ \text{Initial count} &= 256 - 250 \\ &= 6 \end{aligned}$$

Then the 1s delay is obtained by repeating it for 200 times for 200ms.