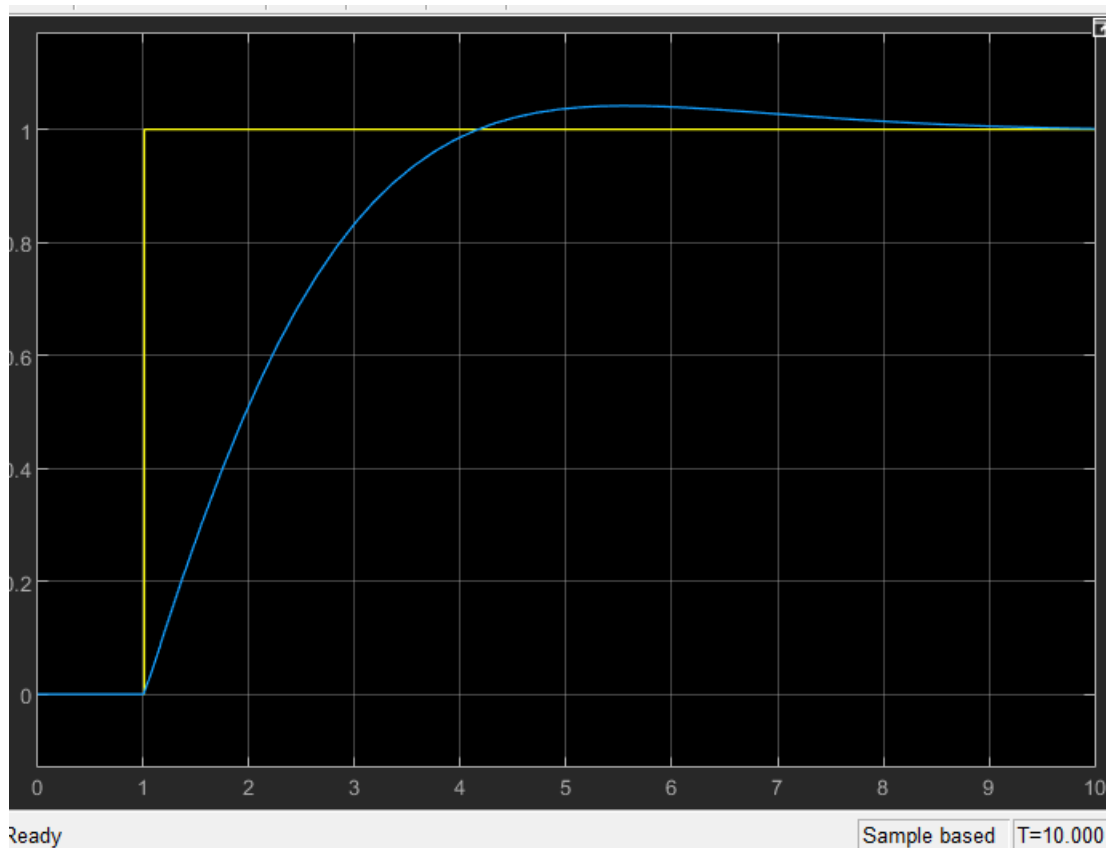
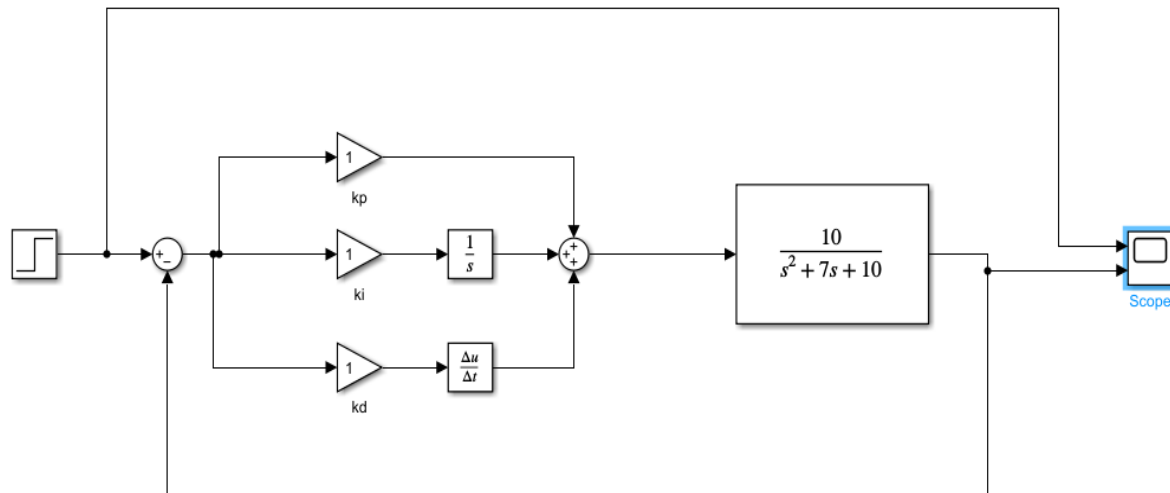


PID controller tuning using s shape methods

→Initial PID Paramters

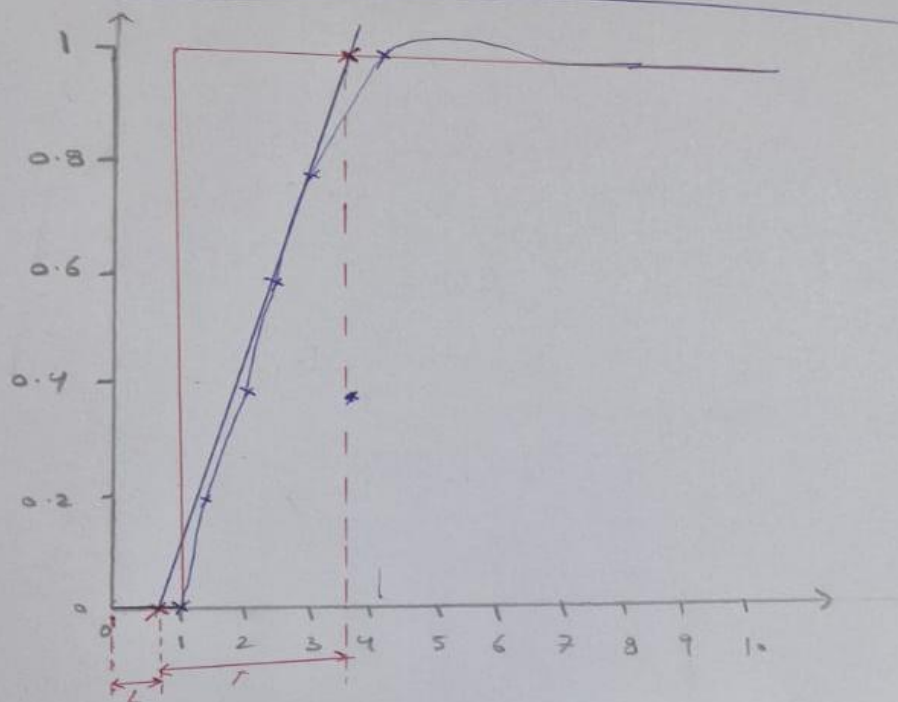


→ S-shape method

بسم الله الرحمن الرحيم

$$G(s) = \frac{10}{(s+2)(s+5)} \rightarrow \frac{10}{s^2 + 7s + 10} \quad T=1.2$$

using s-shape method since no integrator in Transfer function



$$L = 0.8$$

$$T = 3$$

using S-shape Table → To get initial values

$$k_p = 1.2 \left(\frac{T}{L} \right) = 1.2 \left(\frac{3}{0.8} \right) = 4.5$$

$$T_i = 2L = 2(3) = 6$$

$$T_d = 0.5L = 0.5(3) = 1.5$$

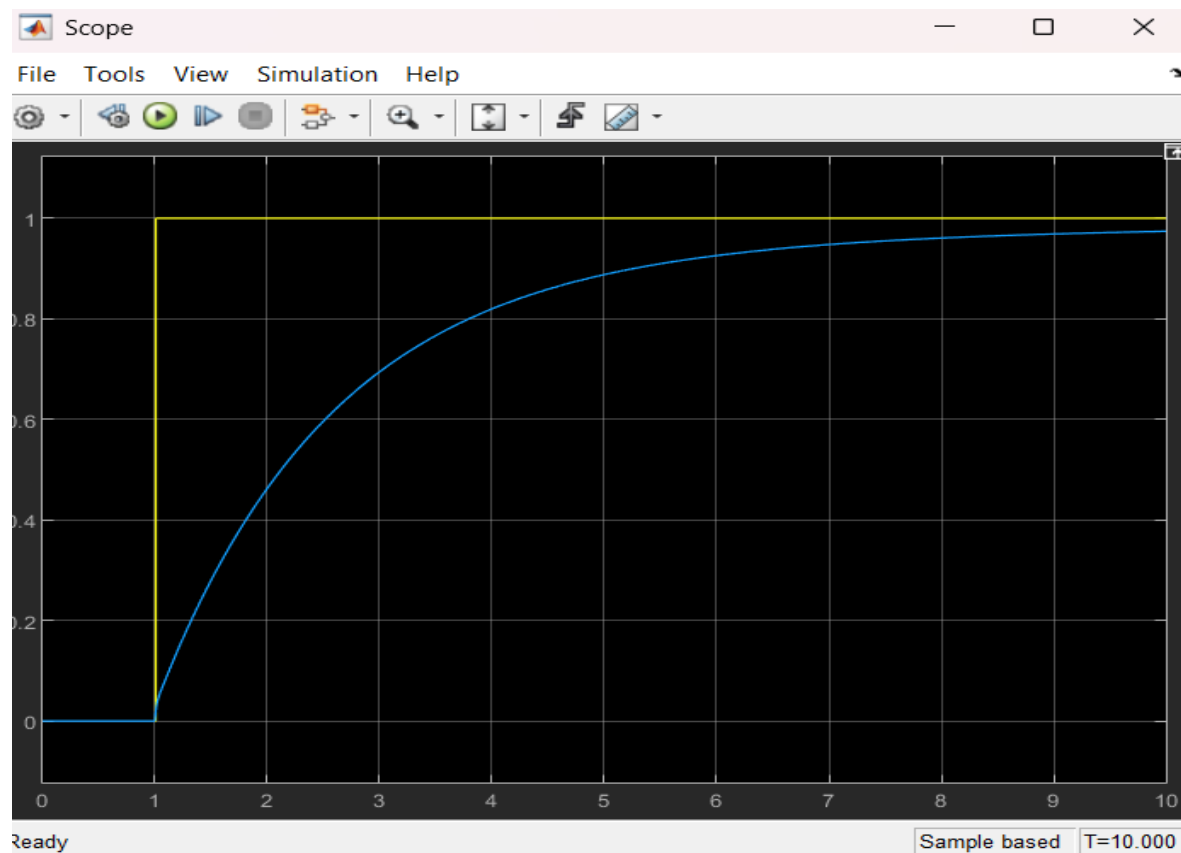
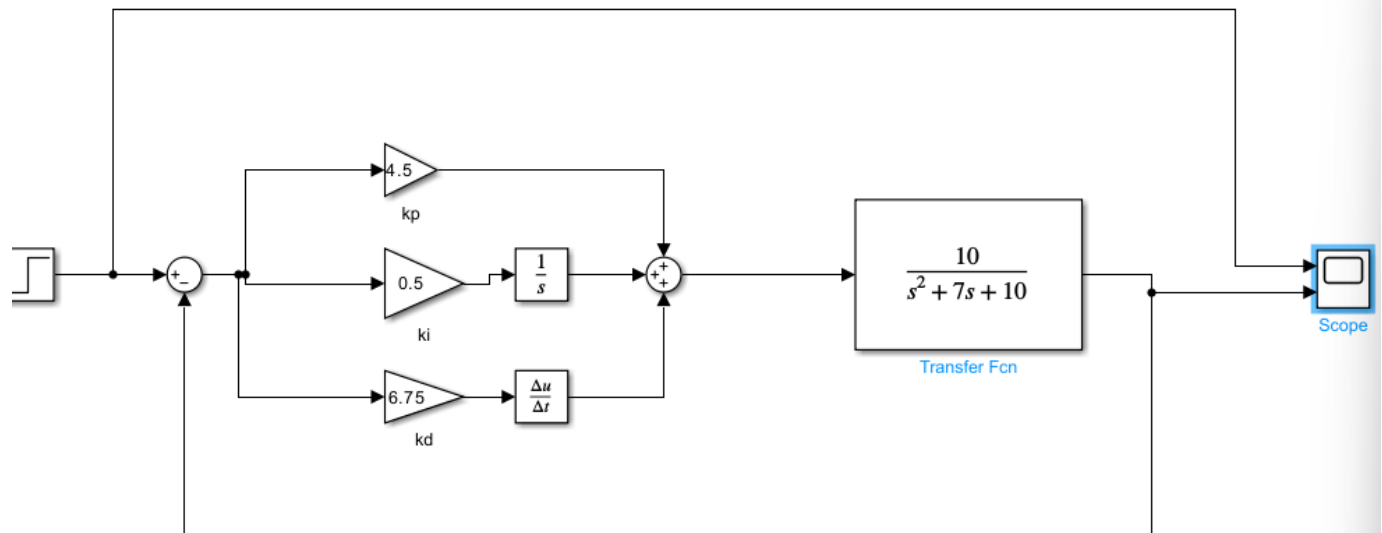
$$k_i = \frac{k_p}{T_i}$$

$$k_d = k_p T_d$$

Parallel PID

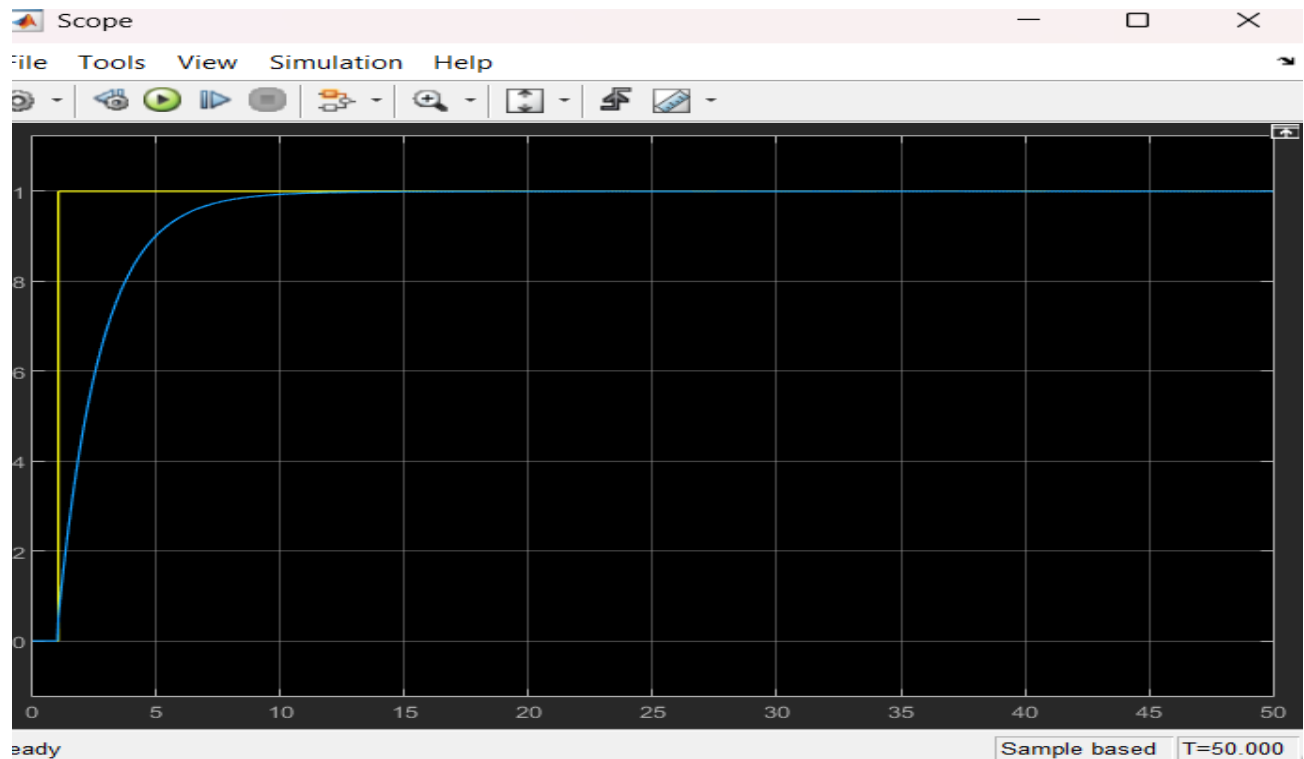
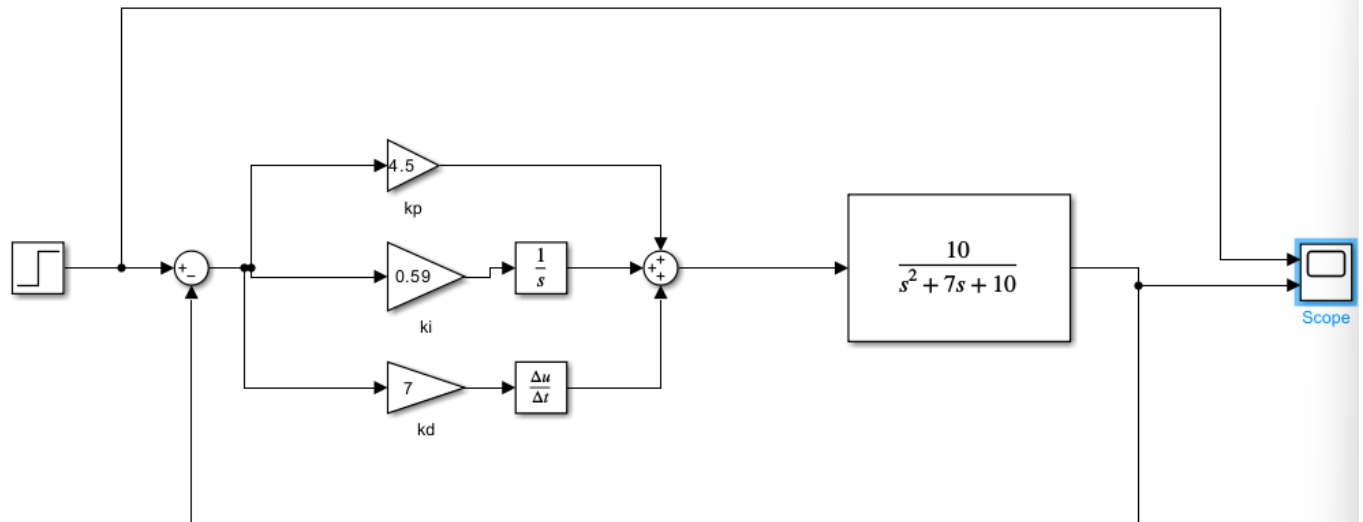
$$\begin{cases} k_p = 4.5 \quad \# \\ k_i = 0.5 \quad \# \\ k_d = 6.75 \quad \# \end{cases}$$

->Using values obtained from s-shape Kp=4.5 , ki = 0.5, kd =6.75



-After inserting these value we can see the overshoot of the system has decreased and system is close to steady state error equal to zero.

->Increasing slightly k_i to 0.59 and k_d to 7



->After increasing these values slightly the system was able to reach steady state error to zero and no overshoot.