Simulations have been done based on nearly same rise time. By seeing results of simulation tuning parameters have been decided.

1.a. Simulation for bumpless controller with Tc = Sc, simulation for unit step change for K = 2; ti = 40; td = 2.5;

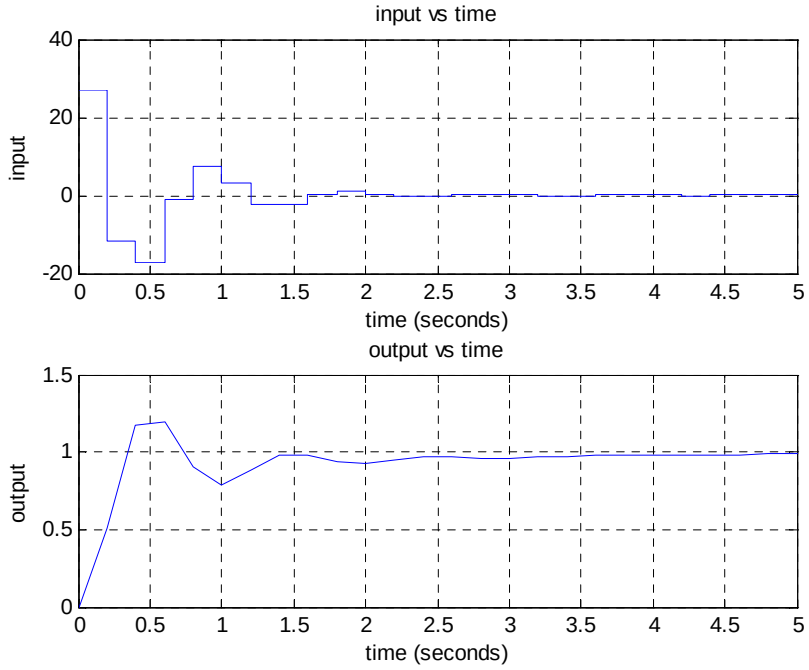

Figure 1

1.b. Simulation for bumpless controller with Tc = Sc, simulation for unit ramp input

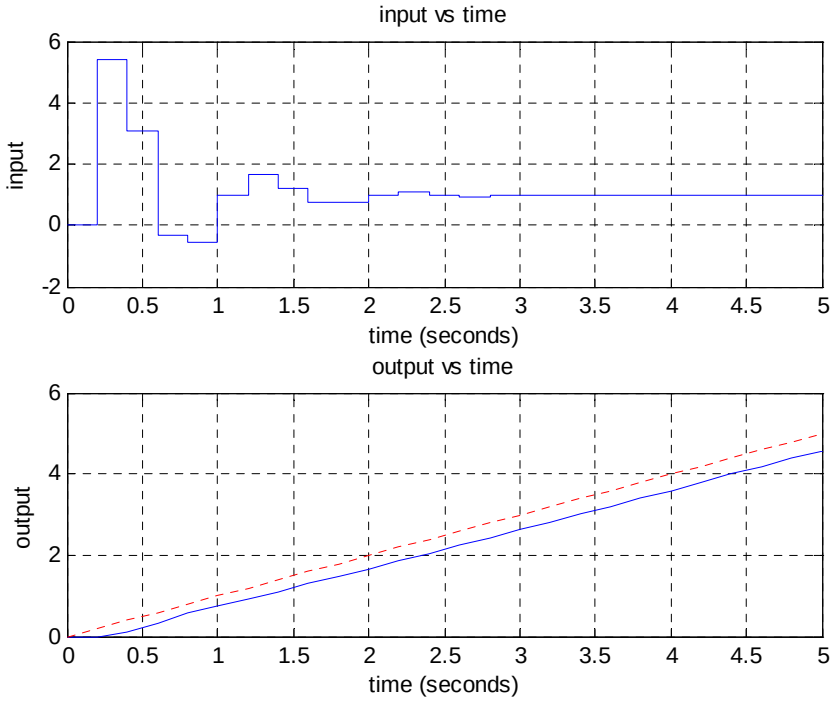

Figure 2

2.a. Simulation for with filtering and Tc = Sc

for K = 3; ti = 40; td = 1.2;

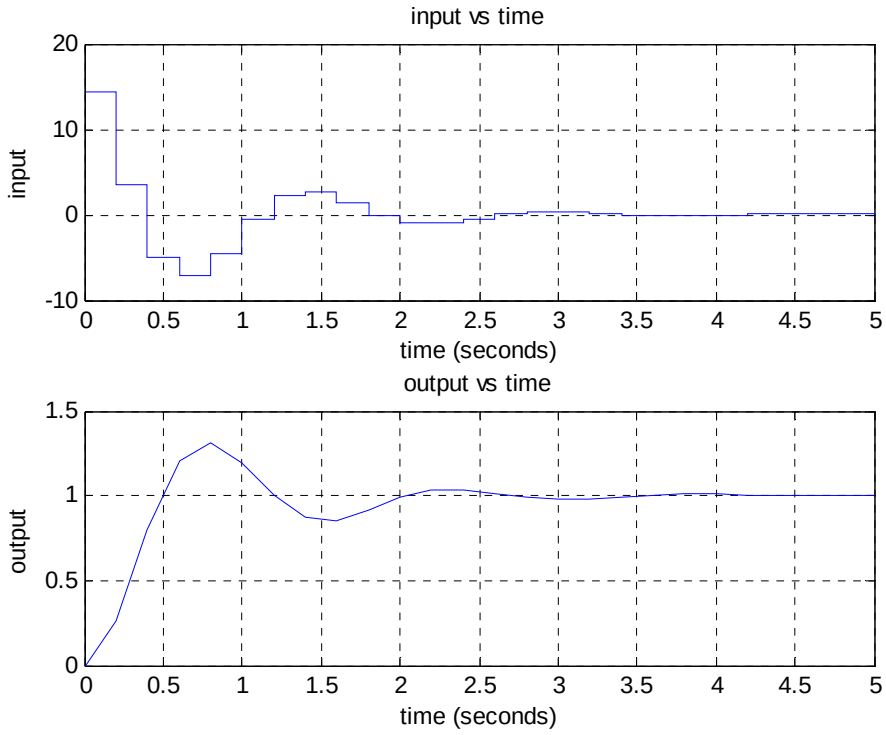

Figure 3

2.b. Simulation for with filtering and Tc = Sc, for unit slope ramp input

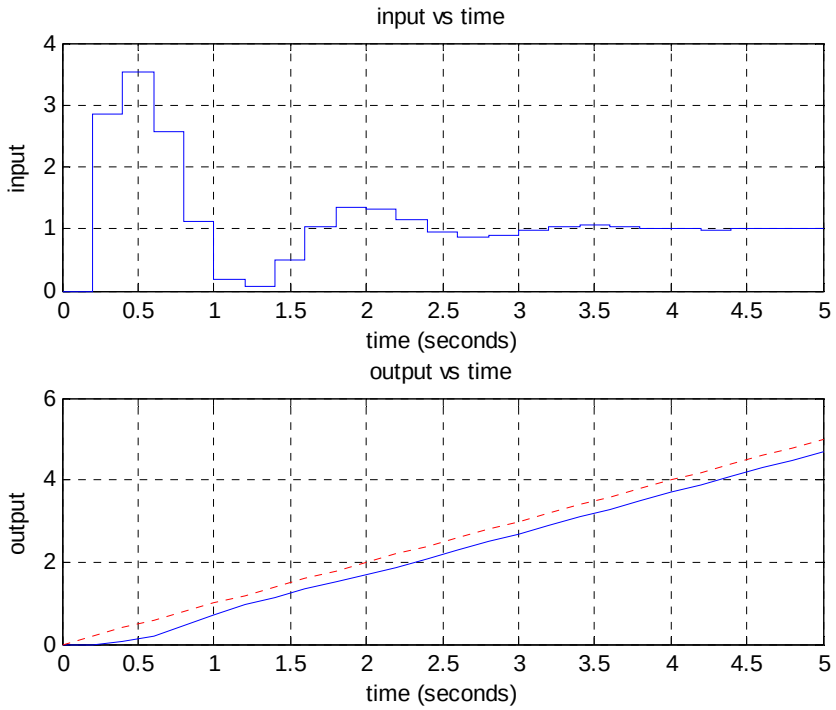

Figure 4

3.a. 2-DOF PID Controller with Tc = Sc(1), for unit step input

for K = 15; ti = 0.8; td = 0.30;

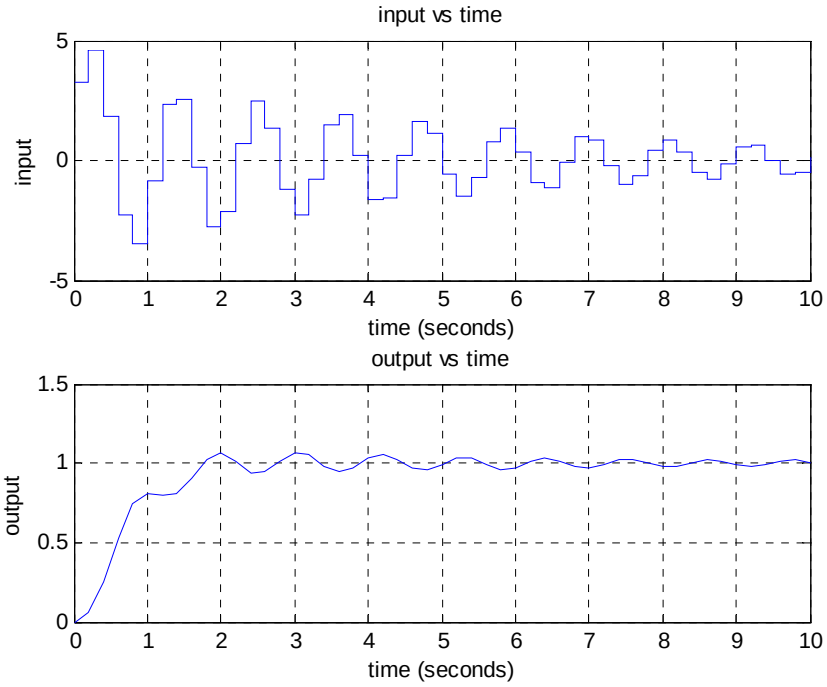

Figure 5

3.b. 2-DOF PID Controller with Tc = Sc(1), for unit ramp input

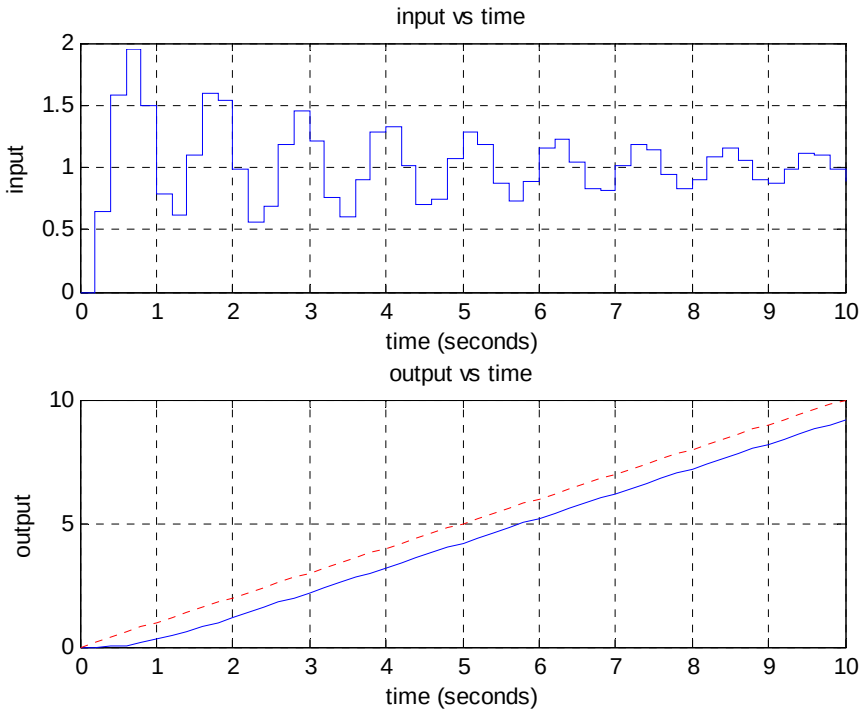

Figure 6

4.a. 2-DOF PID Controller with Tc = Sc(1) and N = infinite, for unit step input

for K = 30; ti = 0.4; td = 0.1;

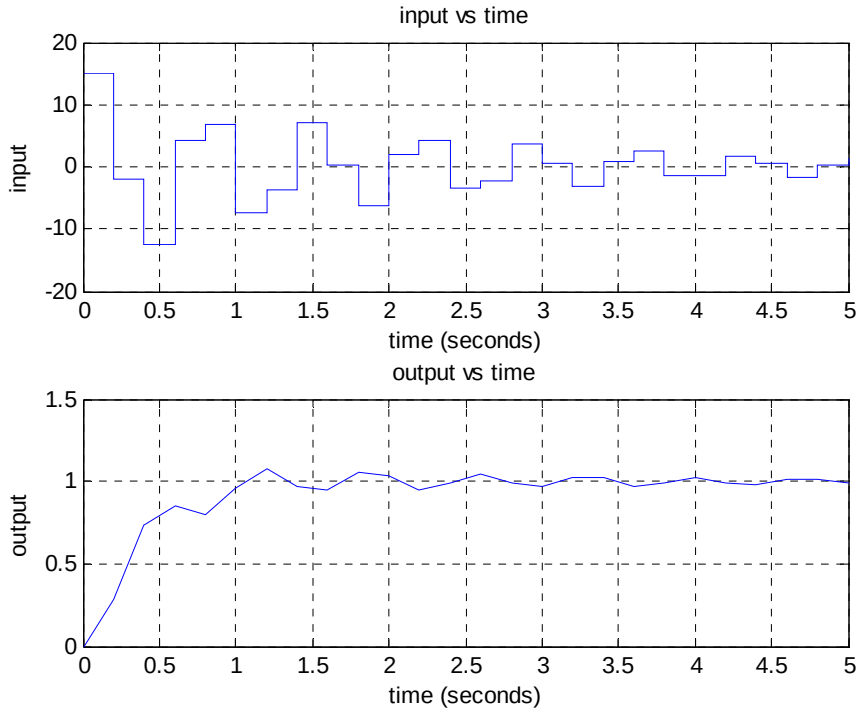

Figure 7

4.b. 2-DOF PID Controller with Tc = Sc(1) and N = infinite, for unit ramp input

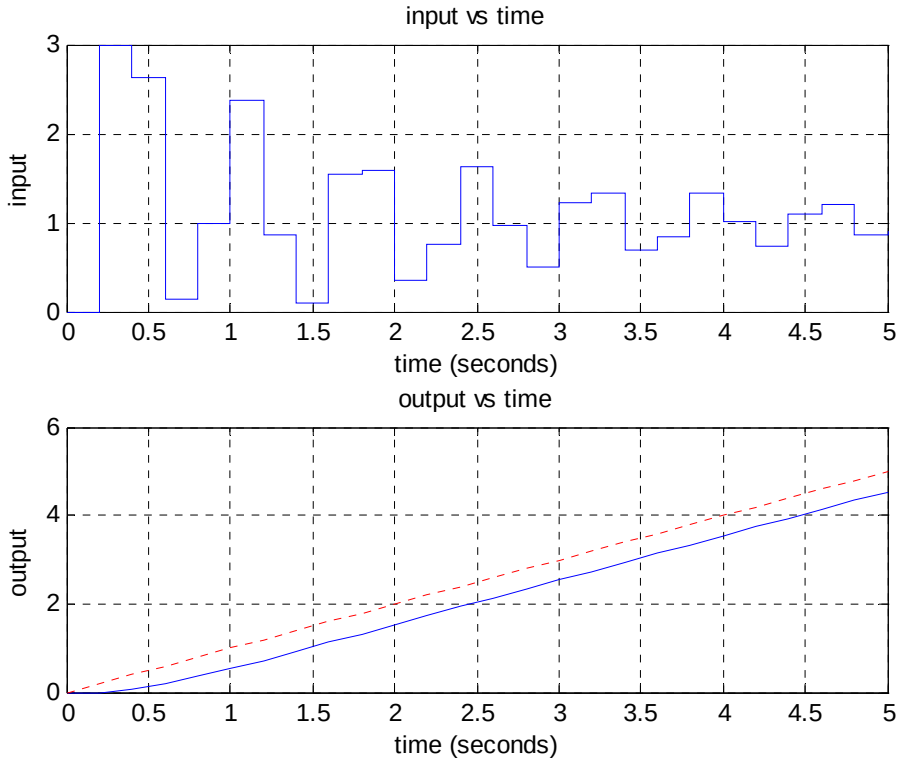

Figure 8

5.a. 2-DOF PID Controller with Tc(1) = Sc(1), for b = 0.5, for unit step input

for K = 15; ti = 0.8; td = 0.35;

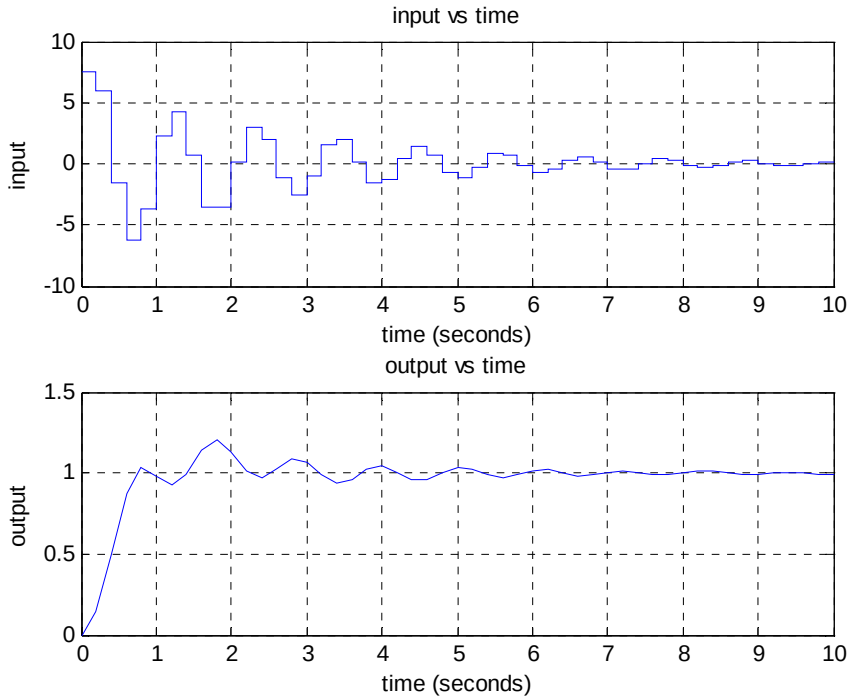

Figure 9

5.b. 2-DOF PID Controller with Tc(1) = Sc(1), for b = 0.3, for unit step input

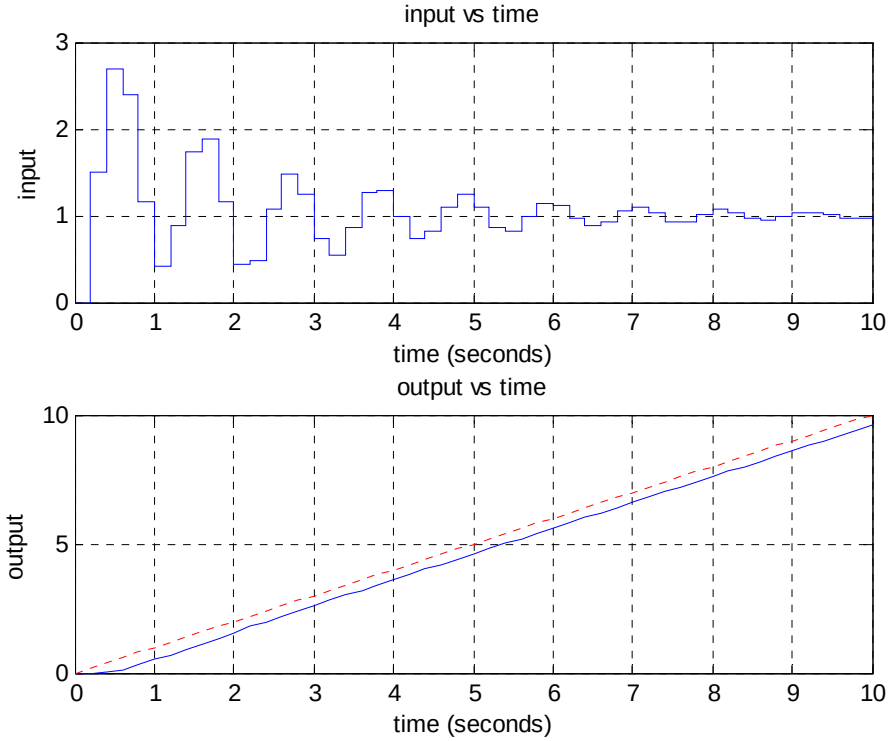

Figure 10