Task specification

**2.1 Task 1**

Design a PID controller using the following discrete time equation.

y(k) = yp(k) + yi(k) + yd(k)

Where,

yp(k) = Kp\*e(k)

yi(k) = yi(k − 1) + Ki\*Ts\*e(k)

yd(k) =(Kd/Ts)\*[e(k) − e(k − 1)]

Ts = 0.01

**2.2 Task 2**

For the given two plant models, reuse the same PID controller using Model Referencing.

**A.** **Cruise Control:**

<https://ctms.engin.umich.edu/CTMS/index.php?example=CruiseControl&section=Simulink%20Modeling>

Tune the Kp, Ki and Kd gains for the PID controller as per the requirements.

1. Rise time < 10s
2. Overshoot < 10%
3. Steady-state error < 1%

**B. Motor Speed Control:**

<https://ctms.engin.umich.edu/CTMS/index.php?example=MotorSpeed&section=SimulinkM%20odeling>

Tune the Kp, Ki and Kd gains for the PID controller as per the requirements.

1. Rise time < 5s
2. Overshoot < 5%
3. Steady-state error < 1%

**2.4 Task 4**

Generate C/C++ source code from the PID controller and optimize this code for RAM efficiency.