ChE381A: Process Dynamics and Control
Laboratory Assignment 6
Cascade Controller Design

A Simulink process is provided to you.

(a) Design a conventional feedback control system where y_1 is controlled by manipulating u using Zeigler-Nichols PID settings with K_U and P_U estimated from the relay feedback test. Obtain the servo and regulator responses. Note that there are two regulator responses, one for d_1 and the other for d_2.

(b) Design a cascade control system with y_2 being controlled by u in the slave loop and a master controller regulating y_1 by manipulating y_2^{SP}. The slave loop is P only with ZN settings. The master loop is PID with ZN settings. The relay feedback test is used to estimate K_U and P_U for the slave and master loops. Obtain the servo and regulator responses.

(c) Improve the regulator response for d_2 by model based compensation of the effect of d_2 on y_1.

Compare and comment on the tightness of control achieved in (a), (b) and (c) above.

Submit a short report on the exercise.