**PSET 12 (the last one! Due start of class on 12.6.18)**

**Individual Problem 1:**

Copy the standard block diagram for cascade control. Derive the full cascade loop servo and regulatory transfer functions using block algebra. Compare with what was presented in class.

**Individual Problem 2:**

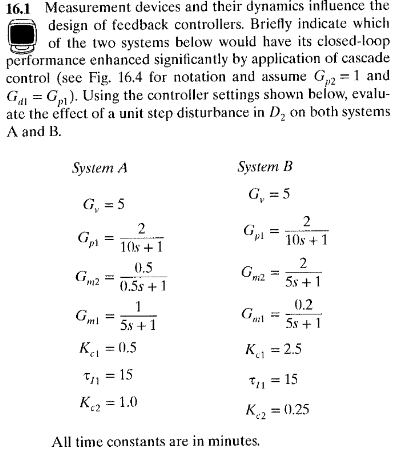
Consider a SOPDT process with the following parameters: Kp = 1.2, Tau1 = 10, Tau2 = 7

That is controlled by a PI controller with the following parameters: Kc = 1.7, TauI = 13.7

(Assume all other transfer functions, such as Gm, Km, Kip, etc. are = 1).

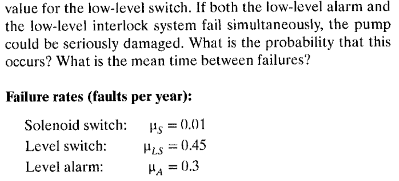
1. Model the effect of changing the SOPDT theta from 0 to 5min to a unit step input change.
2. Over what theta value does the process become unstable?
3. Implement the smith predictor transfer function with theta of 5 min. How does this improve the response time (compare to (a)).

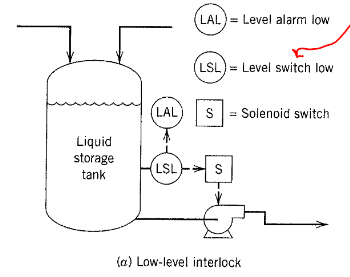
**Individual Problem 3:**



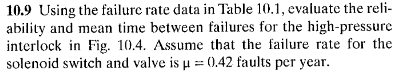
**Group Problem 1 -**







**Group Problem 2 –**



**[Figures and tables on next page]**

