ENGR 121          Homework 16

NOTE: Use engineering format for problems 1 through 3. This is an individual assignment.

1.  You currently have 1 tablespoon of purple-ish food coloring which consists of 20% blue food coloring dye and 80% red food coloring dye. You want to make the mixture a more pleasing shade of purple which would consist of 33% blue dye. If you want a total of 2 tablespoons of the 33% blue dye mixture, then how much blue dye and red dye would you need to add to the existing mixture? blue dye = 0.46 tbs & red dye = 0.54 tbs

2.  Assume the depth of salt water in a fishtank is 1.5 inches (recall that the inside diameter of the tank was 1.6 inches). If the salt concentration of the water is 0.06 wt% NaCl, compute the final salt water concentration after 2 cm$^3$ of water with 1.5% wt NaCl is added to the fishtank. Assume the same amount of water that you add also leaves the through the overflow, where 82% of the water leaving is 0.06% wt NaCl and 18% of the water leaving is 1.5% wt NaCl.  0.108% wt NaCl

3.  A local sawmill preparing the 2in-by-4in piece of lumber for your fishtank project dries its freshly cut lumber in a kiln and stores it before shipping. The freshly cut lumber has 52% by weight water content. The heating process in the kiln results in wood with 32% by weight water content. Subsequent air-drying during storage results in the moisture content dropping to 22% by weight water. If the sawmill ships an average of 2000 lbs/day of the air-dried lumber, what is the amount of freshly cut lumber delivered to the sawmill? Assume that the wood is not planed (or resized) in any way during the process and that the mill ships rough-cut lumber. 3250 lb/day
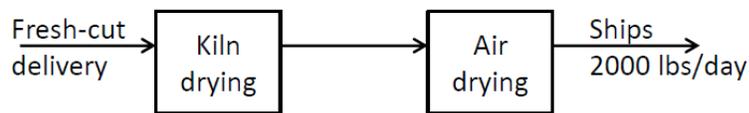


4.  (Due Class 18) Continue to work on fishtank systems with the intelligent control of salinity. Fishtank systems will be due on Class 18, but your instructor will be ready to evaluate them as early as Class 17. You will need to have temperature control as well as intelligent salinity control working for the evaluations. The evaluation sheets can be found in the class materials for Class 14.

5.  (Due Class 19) Group presentation for fishtank project:
    a.  Time: Six minutes with 2 minutes for questions (8 minutes total)
    b.  Participation: All team members must present
    c.  Dress: Professional (business casual) attire
    d.  Presentation should include
        i.    Title slide with project title and the names of each team member
        ii.   Project overview
        iii.  Temperature control system
        iv.   Salinity control system
        v.    Overall system operation
        vi.   Discussion of what worked well and what could be improved
        vii.  Conclusions
    e.  Consider including these topics in your presentation. You are not limited to these topics
        i.    Overview of operation (pictures)
        ii.   Description of system components (pictures, specs, and cost)
        iii.  Circuit diagram and explanation (power supply, transistor, relay, interface to Arduino)
        iv.   Calibration steps and equations for the conductivity sensor and thermistor
        v.    Programming and control
        vi.   Reliability issues