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MET 330
10/08/2022

Test 1 Reflection

1) Problem 1:
    a. **What course objectives are being directly assessed?**
        i. **Compute pressure and the forces (magnitude, location, and direction) associate with it in a stagnant fluid.** In this problem we are tasked to directly use the provided difference in pressure to determine other unknown values such as height.
    b. **How are other course objectives being indirectly assessed?**
        i. **Describe the nature of fluids and define different fluid properties such as viscosity and pressure.** For this problem an understanding of fluid properties is necessary to determine the change in deflection between the different fluids. It is also important to understand how the change in specific gravity affects how the fluids react in the manometer.

    Problem 2:

    1. **What course objectives are being directly assessed?**
        a. **Explain the fluid dynamics in pipes and fittings;** This problem includes energy losses for fittings as well as in the pipes.
        b. **Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems;** Bernoulli's equation is critical in this equation to find the pump head.
        c. **Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.);** Friction losses are required to be calculated for numerous fittings, inlets, outlets, filter, and friction in the pipe.
    2. **How are other course objectives being indirectly assessed?**
        a. **Describe the nature of fluids and define different fluid properties such as viscosity and pressure; A basic understanding of fluid dynamics is required to determine the best way to go about solving the problem.** For example, where to select points for Bernoulli's equation. (open to the atmosphere, negligible velocity, etc…)

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2) Problem 1: I made a major error when drawing my initial diagram, which led me to spend a lot of time coming up with the correct equation to determine the deflection. I was on the right track but did not follow the first recommendation at the top of the exam; to not overthink. I should have spent more time just thinking logically about how the fluid would flow in the manometer. Looking at the provided solution it clicked immediately.

   Problem 2: I made an error when calculating the heat loss value for the gate valve and the swing check valve. I forgot to include the friction factor for both of these and carried the same mistake through when calculating the pressure at the inlet of the pump. Once these errors were corrected my calculated values were almost identical to the provided solution. I should have dug in more deeply when realizing that my value for the energy loss due to the swing check valve was more than 10 times the value of other energy losses. In the future, I would recommend to myself to trust my gut when something doesn't look correct.

3) Based on the provided rubric, I think I should get full points for following the problem-solving rubric. For the first problem I would grade a 4/7. And for problem 2 I would grade a 6/8. For a final score of 70%. The strengths of my test are following the rubric as well as the actual calculations and excel work. My mistakes came from rushing on the second problem and overthinking the solution on the first.

4) The main issue I encountered with the test was understanding the way the fluids would move in the first problem. I spent a lot of time writing an equation, and then realizing there was a mistake and starting over. I should have taken a break from the problem and come back later, and then if that didn't work reach out to the professor for guidance. The steps I took for this test is similar to what I have done in thermodynamics and thermal applications. I usually draw the diagrams for all problems and put down the design considerations and known variables. I like to do this as quickly as possible once the test is out to also give myself time to think about the problems and the methods to solve them. Then I proceed to solve the problems in order.

   A concept that I learned in this test is using excel to run multiple permutations of the same problem and the importance of setting that up in an organized way. This is used all the time in the engineering field. If not with excel, then other software to run calculations. My issue in the second problem highlighted information that was relayed to us by a speaker during one of the ASHRAE student chapter meetings. Essentially as engineer's we don't usually do a lot of calculations by hand, but we need to know when a solution generated by software is incorrect just by looking at the value.

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My goal at this time is to enter in the HVAC/refrigeration field. This course is extremely important along with thermodynamics, thermal applications, and heat transfer. Designing systems for coolant could very well be something that I do in my future career.

I spent about 4-5 hours on this test. I think I could have spent less and had better results if I had taken more breaks and not tried to work through it all in 1-2 sittings. In the future I would better manage my time since we had about almost a full week to complete this.