MET 350 Thermal Applications

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Test 1 Reflection

1) How and why the test demonstrates your work toward one, or more, of the course learning objectives. Be specific on the course objectives you decide to mention.

The first question in the test multiple learning objectives such as understanding how to apply first law and second law of thermodynamics to different thermal systems. The analyzation of a Brayton cycle with regeneration required finding both the work in and out of the system and the heat addition and heat rejection of the system. Another learning objective for the first problem was to apply thermodynamic laws to gas turbine engines using ideal cycles, reheating, regeneration, and intercooling cycles. With the different changes in the parameters each time we evaluated the system there needed to be an understanding of how the changes would affect the efficiency of the system. Finally, in question two the course learning objective of applying thermodynamic laws to a jet propulsion engine using ideal cycles. The problem required determining turbine exit pressure, nozzle exit velocity, and specific heat relations.

2) How your test compares against the available solution. State the mistakes you made and what you will do next time to avoid making same mistakes. Please point out exactly where you made the mistake, say why you made the mistake, and how you should have done it. If you were taking this test again, what advice would you give yourself to ensure that you had a successful test?

In the first problem in the two-stage compressor, I made the mistake and added two turbine stages so in total I had 10 stages where the solutions only had 6 stages. This threw all my calculations off making my net work 367.8 kJ/kg and my q_{in} was much too high at 946.2 kJ/kg. This made my efficiency and effectiveness much different from the solutions. In the second question the first two stages were the same, but when I got to the third stage my pressure was off. My mistake in this question was not using the tables and finding enthalpy. I did it similar to the first question where I used formulas instead of the tables which kept my temperatures fairly close, but my pressures were significantly off. Though my answers to section b and c were fairly close a was much too high of a pressure. I feel I still struggle when it comes to deciding when to use tables vs when to use formulas.

3) What your grade should be. Base it on the writing rubric provided in the test and the correctness of your solution. What are the strengths and weaknesses of your test?

For the first question after using the rubric I had an 68% and the second question I had a 53%. My understanding of the test requirements was off, I read the entirety of the first page but failed to understand that we needed to write out the purpose of the questions, the sources, and design considerations. Having zeros in these sections significantly brought down my score. I assumed that everyone had the same test questions and the purpose of this test was to solve those questions so I didn't write that down, additionally, I didn't know

we needed to write the source of our information because we were all supposed to be using the same textbook with the same tables.

4) Discuss the following:

a. What issues did you encounter in completing the test? How did you troubleshoot them?

In the first question I made the mistake of not converting the higher temperature one to Kelvin and had to redo that section of it. As for the second question I need to better understand when to use tables vs formulas.

b. What steps did you take to complete the whole test? Would you change something?

For each question I first completed the drawings of the PV and TS diagrams then added the different stages and attempted to find both pressure and temperature for each stage. This then allowed me to solve the questions with the use of the first law of thermodynamics.

c. What new concepts have you learned?

I didn't learn any new concept just what was practiced in class. I utilized previous questions we had completed to help solve these problems.

d. Where you think engineers use those concepts (provide specific examples)?

I think many of these concepts are used in the design phase of combustion engines. These designs would be the initial step of building something new without having to put in the money to prototype something and have it fail when you could have just theoretically solved it and saw that it wouldn't work for the material selected. Once an engine has been designed and has a proven concept most technicians would utilize gauges to identify pressures and temperature in the system.

e. Where do you think you will be using everything you learned?

I would use this in a job where we were designing combustion engines from infancy and wanted to get the theoretical data before proceeding.

f. Do you think what you learn is important for your professional career?

In my current professional career, I think it would be beneficial to be able to theoretically find the data we solve for in this course but in practicality in my career it wouldn't really benefit myself as a naval engineer, which isn't design system but maintaining and fixing them.

g. How, when, where and why you might use this information or skill in the future?

I don't think in the near future I will be utilizing this information gained in this course in my career field.

h. Have you been able to apply concepts you have learned in the course to what you do at work or in other courses?

I wouldn't really apply this inform in my day-to-day job but I could see the uses of it had I not already taken heat transfer.

i. What areas did you feel you were most successful, or improved the most?

I feel I understand the cycles much better than I initially did and have better understanding of the formulas and how to utilize them.

j. How do you see this course's content intersecting with your field or career?

So far in the course I don't see much use of the combustion cycles in my career however I have used many refrigeration tables to help troubleshoot faulty air conditioning and refrigeration equipment, so I am looking forward to that section to see if it is still similar to what I remember.

k. How much time did you spend on the test? How was the time organized? What

would you do differently? Why?

I spent about 4 hours total over two separate days to finish this test. I feel I organized the paper well and the data is very legible. Next test I will be sure to include all of the sections on the rubric so I get full points unfortunately, my assumptions are going to cost me quite a few points on this test.