MET 350: Test 1 Reflection

Carter Fishback 28 Feb 2019

1) The main goal for test one was to assess our ability to distinguish and solve for the states of pure gas combustion cycles. Topics tested included the Otto, Diesel, Brayton, and Jet cycles. Specific design assumptions were made in order to calculate the properties at each state. Air was considered as the primary gas for the combustion process and isentropic processes were applied between the appropriate points. This allowed for us to accomplish the objectives of solving these types of problems on the test.

2) After comparing my work to that of the test solutions, it appears that the only mistakes that were made involved simple labeling errors. This effected the final calculations for the properties and answers to the problem.

In question one, for cases B and D, I mislabeled or substituted the wrong q_{in} value used to find the thermal efficiency. The rest of the properties were found with the correct formula; however, I made the small mistake of not reviewing my variables. This mistake caused me to calculate a thermal efficiency much higher than was intended for those specific cases. For future tests I will need to ensure that my labels are correct for the variables that I need to find.

Question two involved variable specific volume and heats which meant that the tables had to be used. There were also isentropic efficiencies provided to find prime versions of each state. My final answers for the thrust and velocity of the gasses at that the exit of the diffusers were incorrect. However, the properties for states 3a and 5a were found to be slightly less than that of the solutions. I also assumed that since there was 5a state that there would also need to be a state 6a. During those calculations of interpolation, I seemed to have made some mistakes when reading the tables. These errors are examples of simple mistakes that can fixed by double checked to limit the amount of error in my answers.

3) Recommended Grade:

Writing		Problem 1		Problem 2	
Purpose (0.5/10.0)	0.5	Single Stage Compression with Variations Diagrams (1/14)	1	P-v and T-s diagrams (2/8)	2
Drawings (1.0/10.0)	1	Two Stage Compression with Variations Diagrams (1/14)	1	State Calculations (4/8)	4
Sources (1.0/10.0)	1	State Calculations with Single Stage Compression (4/14)	4	Thrust (1/8)	0.5
Design considerations (1.0/10.0)	1	State Calculations with Two Stage Compression (2/14)	2	Final results (1/8)	0.75
Data and variables (0.5/10.0)	0.5	Why Does Regeneration Hurt in Original Case (1/14)	0.5		
Procedure (2.0/10.0)	2	w_net, q_in, Thermal efficiencies, All Cases (2/14)	1.5		
Calculations (2.0/10.0)	1.8	HW Effectivness, All Cases (1/14)	1		
Summary (0.5/10.0)	0.5	Which Case is Better? (1/14)	0.8		
Materials (0.5/10.0)	0.5	Final Results (1/14)	0.8		
Analysis (1.0/10.0)	0.8				
Total Points (x/10.0)	0.96	Total Points	0.9	Total Points	0.90625
Final Grade	81.85				

4) I felt prepared for this test and did not run into many significant problems. By completing the weekly homework assignments, the problems provided a good foundation of the concepts needed to complete the test. One new strategy I applied to this test was to write out all of the knowns and unknowns about the problem. By doing this, I was able to write up a detailed procedure as to how each state or property could be found. For this test we learned how to calculate the efficiencies of various thermodynamic cycles that use air as the primary fluid.

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The academic concepts on this test are crucial for me to understand as one of my primary interests is working with engines, or any power producing cycle, to make them more efficient. Thermodynamic analyses are used on different power cycles to complete such a task. Skills learned in this class can and will be applied in the automotive or power distribution industry to determine the best ways to improve their effectiveness and environmental impact. In recent years it has become more relevant for engineers to start thinking of environmentally safe methods of producing energy. I foresee in the near future that engineers will need to modify or adjust current power cycles in order to make them more efficient or have less of an impact on the environment. This cannot be achieved without the skills taught in this class. It is my goal one day to help design or build a safe and efficient engine that is more effective than what is currently in use. This passion was not truly known up unto taking this course and discussing about how inefficient modern power cycles are. I understand that there is no guarantee of making a perfectly functioning engine, but engineers are capable of developing much more efficient cycles.

I spent approximately 6-7 hours on this test, however, some of that time was writing the initial information on paper and developing a procedure to solve for the states. About 2-3 hours were actually spent on the mathematical calculations. In conclusion, I believe that I budgeted my time well for this test and completed it in plenty of time. I will need to focus on rechecking my variables and their values as the mistakes that I made involved simple mislabeling or swapping of equations.