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MET 350

Test 2 Reflection

1) This test involves a comprehensive analysis of a steam power plant operating on the regenerative cycle. This directly demonstrates an understanding of thermodynamic cycles, particularly focusing on how energy is transformed and utilized in a power generation as well as the application of thermodynamic principles to enhance efficiency. Calculating the utilization factor, turbine work per kg, mass flow steam, and heat supplied demonstrates the application of engineering principles in analyzing and optimizing thermal systems. Also, the drawing of P-v and T-s diagrams requires understanding the physical processes within the cycle, indicating the ability to visually represent complex thermodynamic processes, which is crucial for both understanding and communication in engineering.

2) Overall, my diagrams for this problem were pretty accurate as my schematic diagram of the system included all components of the cycle in the correct places with all the lines going to the correct components with arrows indicating the directions and every phase numbered 1-10. The P-v and T-s diagrams were also drawn correctly and labeled with the states 1-10, with arrows indicating the correct directions for the cycle, which is crucial in the first step of solving this problem. For the state calculations, all the states were calculated correctly from 1-10, however, I did not draw the arrows from state to state correctly and had them in sequential order instead of following the cycle direction correctly. This did not affect the calculations for the states, and they were still computed correctly, but visually can be confusing to look at. When calculating the work done by the turbine, I used all the correct values and used the correct equation as well but made some minor calculation errors leading me to get a number slightly off from the one in the solution. This also led to the flow rate, Q_{in}, and Q_{out} calculations to be slightly off as those equations were dependent on that value, but the overall process and equations were correct. This can be corrected easily in the future by making sure to double and triple check my calculations so a simple mistake like this does not happen in the future.

3)

WRITING RUBRIC:

Purpose	0.5/10.0
Drawings	1.0/10.0
Sources	1.0/10.0
Design considerations	1.0/10.0
Data and variables	0.5/10.0
Procedure	2.0/10.0
Calculations	2.0/10.0
Summary	0.5/10.0
Materials	0.5/10.0
Analysis	1.0/10.0
TOTAL	10.0/10.0

PROBLEM 1:

1.	Actual cycle diagram	1/14
2.	P-v and T-s diagrams	2/14
3.	State calculations (10 of them)	2/14
4.	Double interpolation for state 6	1/14
5.	Calculate y1	1/14
6.	Turbine work	1/14
7.	Mass flow rate	1/14
8.	Heat rate at space heating	0.5/14
9.	Heat released in condenser	1/14
10.	Utilization factor (need pumps & Qin)	2/14
11.	Final results	0.5/14
	TOTAL	**13/14**

FINAL GRADE:

10.0 + (80)*(13/14) = 84.3

4) Completing this test presented a multifaceted challenge, where I encountered issues primarily in accurately applying theoretical concepts to the regenerative cycle problem and ensuring precision in my calculations and diagrams. To troubleshoot, I revisited course materials and textbooks to reinforce my understanding, particularly focusing on the areas where my solutions diverged from the expected answers. The steps I took involved a thorough review of the principles behind each part of the test question, followed by a careful execution of calculations and diagram drawing. In hindsight, starting earlier and allowing more time for revision would have been beneficial. Through this test, I deepened my understanding of thermal systems and their efficiency optimization, learning new concepts such as the utilization factor and its significance in real-world applications like power generation and space heating. Engineers widely apply these principles in designing and optimizing thermal systems for industries and residential heating solutions, demonstrating the practical relevance of my learning. I foresee applying this knowledge in future engineering projects, where energy efficiency and system optimization are paramount. This experience underlines the importance of these concepts for my professional career, offering foundational skills that I might use in energy system design and analysis. Reflecting on my approach, I recognize improvements in my problem-solving skills and a better grasp of thermal applications, areas where I see significant intersection with my career in mechanical engineering. Spending around 10 hours on the test, I learned the importance of structured preparation and the need for a more strategic time management plan, insights I'll carry forward to enhance my academic and professional competencies.