MET 350

Test 2

3/23/25

Elson Edmonds II

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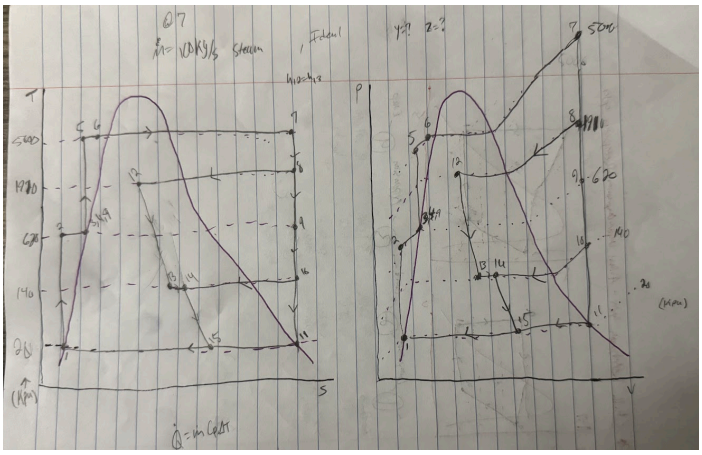
1.

Purpose:
(a) Determine the fraction of extracted mass “y” and “z” for the open and closed feedwater heater respectively that guarantees the proper operation of the cycle.
(b) Determine the cooling water temperature rise in the condenser, in oC, when the cooling water flow rate is 4200 kg/s. Assume Cp = 4.18 kJ/kg·K for cooling water.
(c) Determine the rate of heat rejected in the condenser, the produced net power, and the thermal efficiency of the plant.

Diagram and variables:



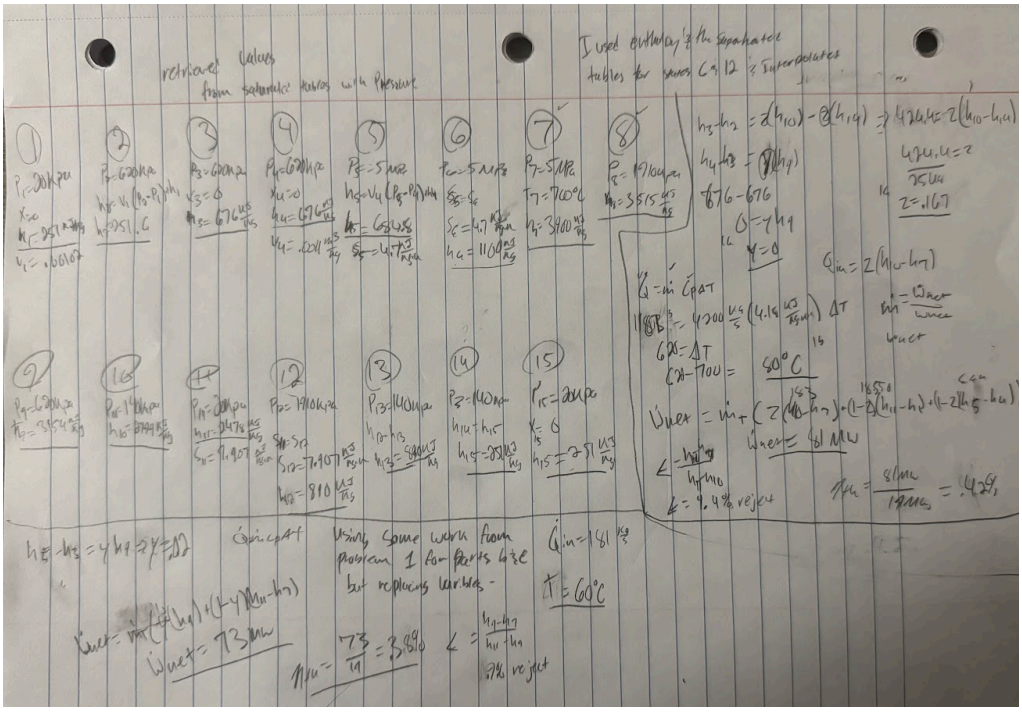
Sources:

Notes from class
Appendix 1 - saturated and superheated tables

Design Considerations:

Based on the description, I assumed:
Ideal cold air-standard
ideal Rankine steam cycle
two closed feedwater heaters and one open feedwater
cycle receives 100 kg/s of steam
Steam trap at 1910 kpa is malfunctioning

Procedure and Calculations:



Summary:

Y = 0
Z = .167
T = 80C
Wnet = 81 MW
Heat rejected = 4.4%
Efficient = .42%

Analysis:

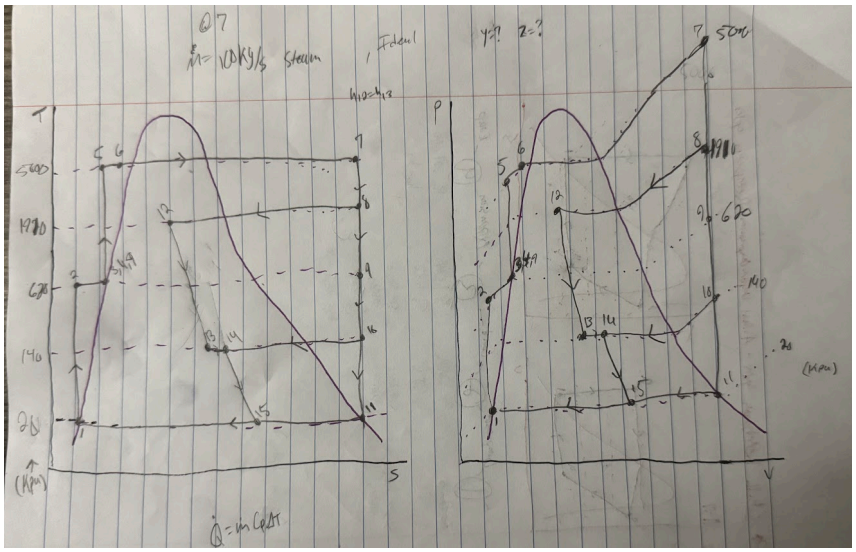
These results make sense due to the theories that we have learned in class from as about the brayton cycles and the patterns that recur. The only thing that I don't know if I properly assumed is that Y equals zero since the steam trapped stopped working. I based all of my results off of this theory.

2.

Purpose:

(a) Determine the fraction of mass “y” extracted for the open feedwater heater that guarantees the proper operation of the cycle.
(b) Determine the cooling water temperature rise in the condenser, in oC, when the cooling water flow rate is 4200 kg/s. Assume Cp = 4.18 kJ/kg·K for cooling water.
(c) Determine the rate of heat rejected in the condenser, the produced net power, and the thermal efficiency of the plant.

Diagram and variables:



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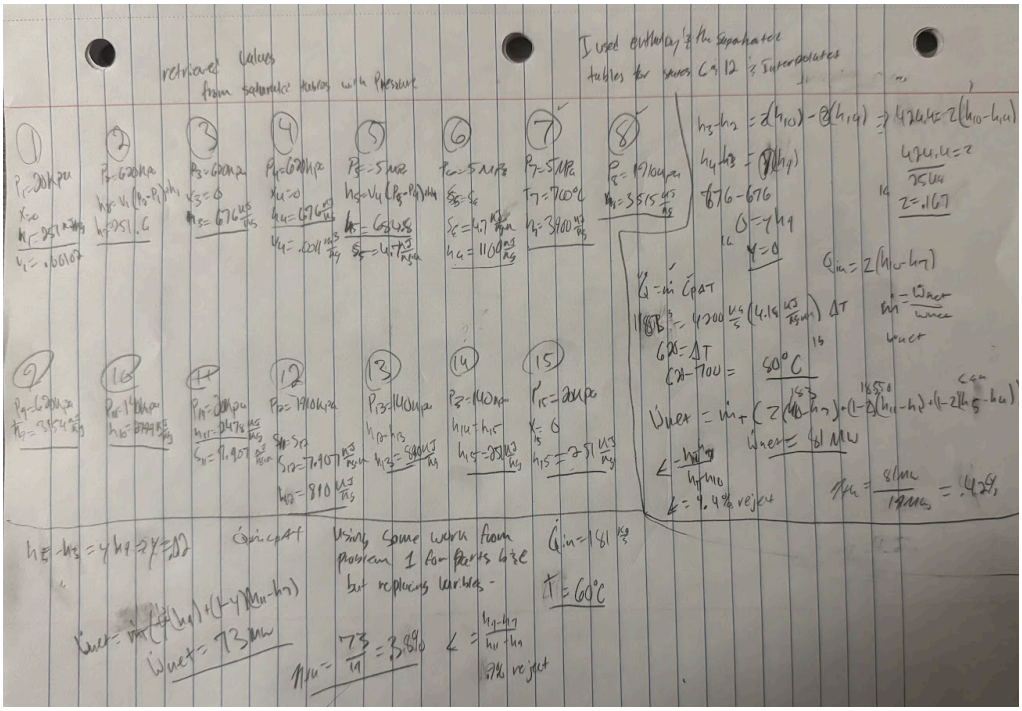

Summary:

Y = .02
T = 60C
Wnet = 73 MW
Heat rejected = .9%
Efficient = .38%

Analysis:

These results make sense due to the theories that we have learned in class from as about the jet cycles and the patterns that recur. My answers seem to be of reasonable assumption based on the theories that we have discussed in class. Expect for my heat rejected that number is higher tahn what seems normal.