

Solution

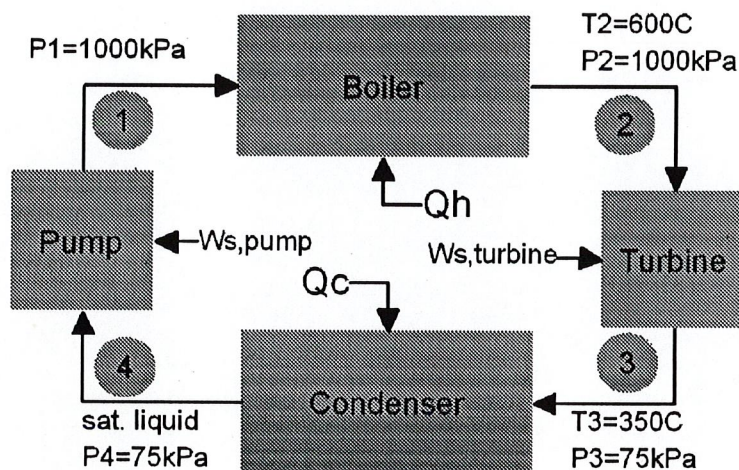
I. 60 points

For the Rankine cycle using steam shown below and applying usual assumptions for the Rankine cycle:

a. 30 points

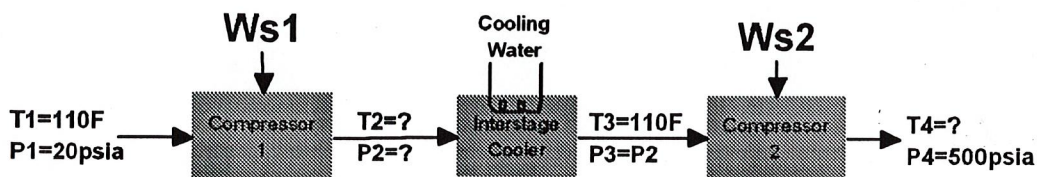
Find the turbine efficiency, η_{TURBINE}

b. 30 points

Find the thermal efficiency of this Rankine cycle, η_{cycle} 

II. 40 points

A two-stage compression sequence as given below operates on R-500 refrigerant; P-H diagram attached.



a. 30 points

Find the intermediate pressure, P_2 , which minimizes the total work requirement, $(W_{s1} + W_{s2})$, assuming adiabatic operation of the compressors and that each compressor has an efficiency of 0.75, show your work.

b. 10 points

Find the heat load on the interstage cooler, i.e., the amount of heat transferred to the cooling water.