

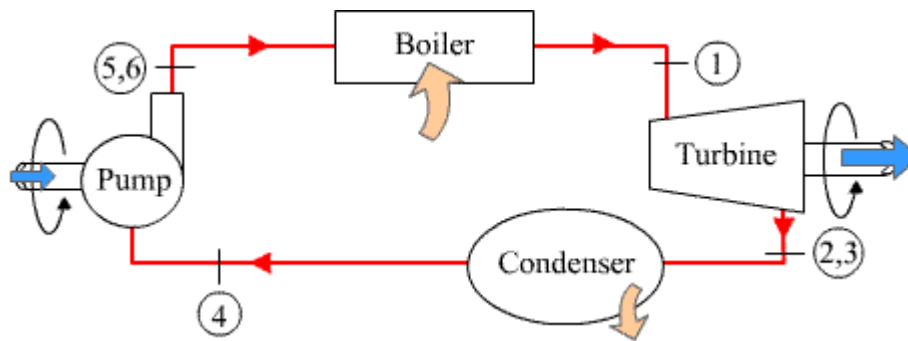
mech 262 – assignment 4

Rankine cycle: super-heat and re-heat

Question 1

A power plant operates on a simple Rankine cycle producing a net power of 100 MW. The turbine inlet conditions are 15 MPa and 600°C and the condenser pressure is 10 kPa. If the turbine and pump each has an isentropic efficiency of 85% and there is a 5% pressure drop in the boiler, determine:

- The thermal efficiency,
- The mass flow rate of steam in kg/h, and
- The back work ratio. (Note: back work ratio = W_P/W_T)



Question 2

Consider a steam power plant that operates on a reheat Rankine cycle. Steam enters the high pressure turbine at 9 MPa, 600°C and leaves as a saturated vapor. The steam is then reheated to 500°C before entering the low pressure turbine, and is condensed in a condenser at 7.5 kPa. The mass flow rate is 150 kg/s. Determine:

- The net power developed,
- The rate of heat transfer to the working fluid in the reheat process; and
- The thermal efficiency,
- What would the rate of heat transfer be if steam were reheated to 550°C ?

