

Problem 1:

A power plant operates on a Rankine cycle with steam as the working fluid. Both the pump and the turbine are ideal. Assume that the working fluid leaves the condenser as a saturated liquid at 1 bar. Calculate the net power for 1 kg/s of steam and the thermal efficiency when the steam at the beginning of expansion is at 50 bar and **(a)** saturated, **(b)** 350°C, and **(c)** 640°C. Show all three cycles on the same T - s diagram. Neglect kinetic energy changes and pressure drops.

Problem 2:

A Rankine-cycle power plant has one stage of reheat. The turbine inlet is 5 MPa at 500°C. After expansion to 0.5 MPa the steam is reheated to 500°C and expanded in a second turbine to a condenser pressure of 7.5 kPa. The steam leaves the condenser as saturated liquid. Calculate the cycle efficiency, using a pump efficiency of 0.6 and turbine efficiencies of 0.8. Neglect kinetic energy changes and pressure drops.