**Tutorial – 8 Vapour Power Cycles**

1. Consider Rankine cycle. Water enters the pump at 100 kPa and leaves at 0.8 MPa, water from the boiler leaves as saturated vapour. This steam enters the turbine and leaves to condenser at 100 kPa. Calculate the heat added in the boiler and efficiency of the cycle. Consider the pump and turbine to be reversible and isentropic. Compare the efficiency with respect to Carnot cycle efficiency.
2. Consider the above cycle. Instead of 100 kPa, if the condenser operates at 6 kPa, find the cycle efficiency. All other conditions remain the same. Compare the cycle efficiency with Carnot efficiency.
3. (a) Consider the conditions of problem 1. Now the steam is superheated to 400 oC. Find the cycle efficiency. (b) If cycle conditions are that of problem 2, what is the cycle efficiency?
4. Consider the conditions of problem 3(b). Instead of expanding to 800 kPa in turbine directly, the steam is expanded to 500 kPa first in high pressure turbine. The resulting steam is superheated to 400 oC at 500 kPa. This steam is passed through low pressure turbine to the condenser pressure of 6 kPa. Find the cycle efficiency.
5. Repeat all the problems with isentropic efficiencies for turbine and pump as 0.8 and 0.6 respectively.
6. Make a table and compare the heat inputs, work outputs, quality at the exit of the turbine, and efficiencies of the problems 1 – 4.