



**APPLIED THERMODYNAMICS
TUTORIAL 4**

Dated 24.8.2016

Time: 50 Mins

Q.1 Calculate the equivalent evaporation and efficiency of the boiler for the following data:

Pressure of Steam = 900 kPa, Quality of steam = 0.97 dry, Quantity of steam = 5600 kg/h, Temperature of feed water = 35 °C , Coal Consumption = 700 kg/h, C.V of coal = 31380 kJ/kg of fuel

What will be the saving in coal consumption per hour if by putting an economizer the temperature of feed water is raised to 100°C and other data remains the same except the increase of boiler efficiency by 5 %?

Q.2 A steam power plant operates on an ideal reheat-regenerative Rankine cycle and has a net power output of 80 MW. Steam enters the high-pressure turbine at 10 MPa and 550°C and leaves at 0.8 MPa. Some steam is extracted at this pressure to heat the feedwater in closed feedwater heater. The rest of the steam is reheated to 500°C and is expanded in the low-pressure turbine to the condenser pressure of 10 kPa. Assume that the feedwater leaves the heater at the condensation temperature of the extracted steam and that the extracted steam leaves the heater as a saturated liquid and is pumped to the line carrying the feedwater. Show the cycle on a $T-s$ diagram with respect to saturation lines, and determine (a) the mass flow rate of steam through the boiler and (b) the thermal efficiency of the cycle.

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