

Boiler Efficiency: it is the ratio of the heat actually utilized in Generation of steam to the heat supplied by the fuel in the same period.

$$\text{Boiler Efficiency} = \frac{m_a (h - h_f)}{C}$$

Where m_a = mass of water actually evaporated into steam per kg. of fuel at the working pressure.

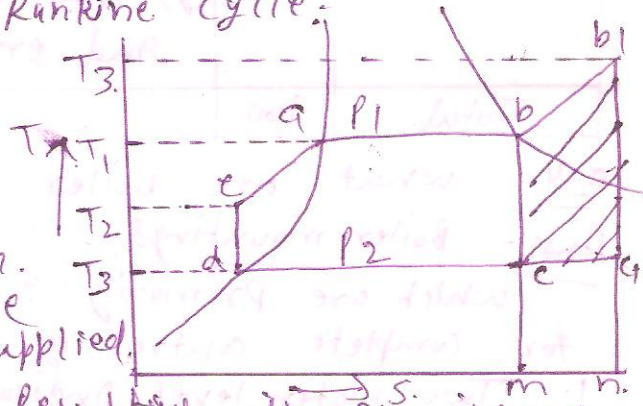
C = calorific value of fuel in kJ/kg.

Q.6 Discuss the Effect of Superheat, maxm pressure and exhaust Press on Performance of Rankine cycle.

Ans Effect of Superheating:-

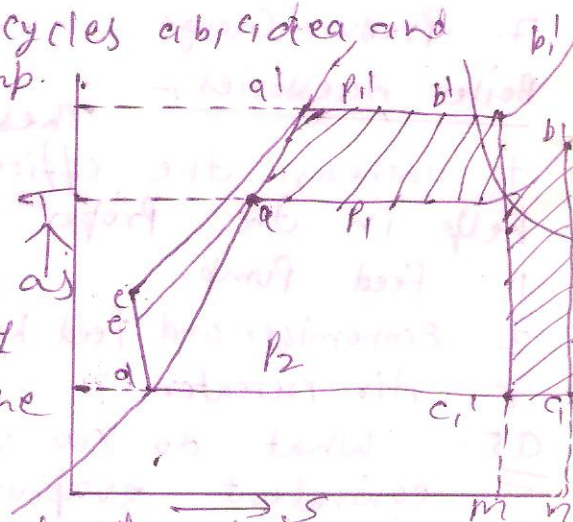
Let abcdea using dry saturated heat steam and abc'dea using superheated steam. The extra work done using extra heat shown by area bb'b'm.

The superheating increases the average temp. at which steam would be supplied to the engine or turbine thereby resulting in an increase in the cycle efficiency of the cycle.



Effect of maxm Pressure:

The two cycles abc'dea and abcdea have the same minm inlet temp. and the exhaust pressure p_2 but $p_1' > p_1$. The increase and decrease in Network is Almost same, However there will be considerable decrease in heat rejection as in Area c', c', m. The Average temp of heat addition Also increases with the increase in supply pressure.



Effect of Exhaust Pressure: The effect of reducing exhaust Press. from p_2 to p_2' . In this case while the network increase as shown by the Area c'd'e'edc the heat supplied Also correspondingly increase as given by the Area e'nmel. These two Areas are Almost same.

From the foregoing discussions we see that the Rankine efficiency can be increased by

1. Using superheated steam.
2. Increasing steam supply pressure i.e maxm Press.
3. Decreasing exhaust or condenser pressure.

