

5.3 Mean Temperature of Heat Addition:

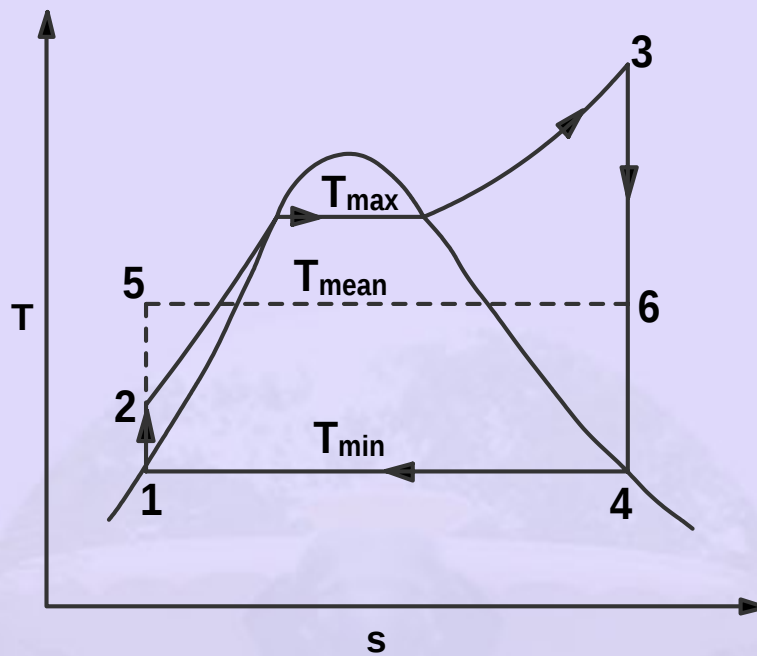


Fig.5.3. Mean temperature of heat addition

If T_m is the mean temperature of heat addition as shown in the above figure, so that the area under curve 2-3 is equal to area under curve 5-6, then heat added.

$$Q_1 = H.A = (h_3 - h_2) = T_m(s_3 - s_2)$$

$$T_m = \frac{(h_3 - h_2)}{(s_3 - s_2)}$$

If $Q_2 = \text{heat rejected} = (h_4 - h_1) = T_{\min}(s_4 - s_1) = T_{\min}(s_3 - s_2)$

$$\eta_{\text{rankine}} = 1 - \frac{Q_2}{Q_1} = 1 - \frac{T_{\min}(s_3 - s_2)}{T_m(s_3 - s_2)}$$

$$\eta_{\text{rankine}} = 1 - \frac{T_{\min}}{T_m}$$