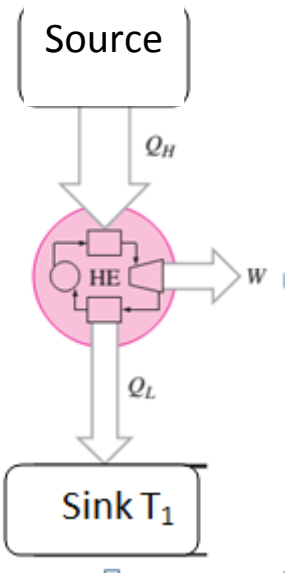
جامعة تكريت

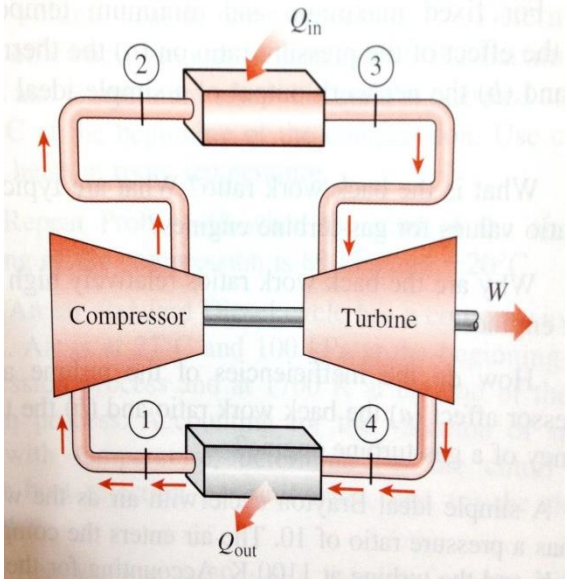
كلية الهندسة قسم الميكانيك

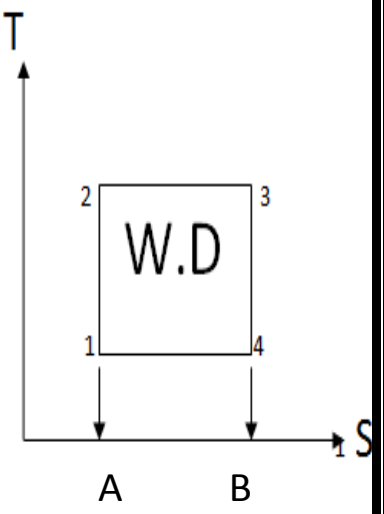
محاضرة اساسيات دورات التبريد

المادة: تكييف التاريخ ٣١ ايار 2021

Carnot cycle







Let $Q_H = Q_{in} = Q_1$ and $Q_L = Q_{out} = Q_2$

Heat supplied= Q_1=area A23BA=$T_2(S_B-S_A)$

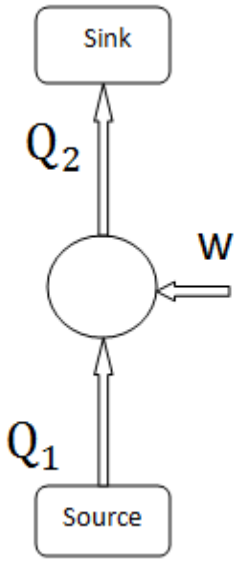
Heat rejected=Q_2=area A14BA=$T_1(S_B-S_A)$

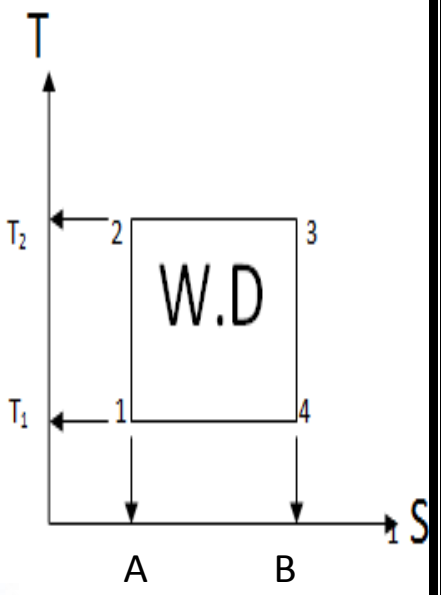
Work done= $Q_1 - Q_2 = (T_1-T_2)(S_B-S_A)$

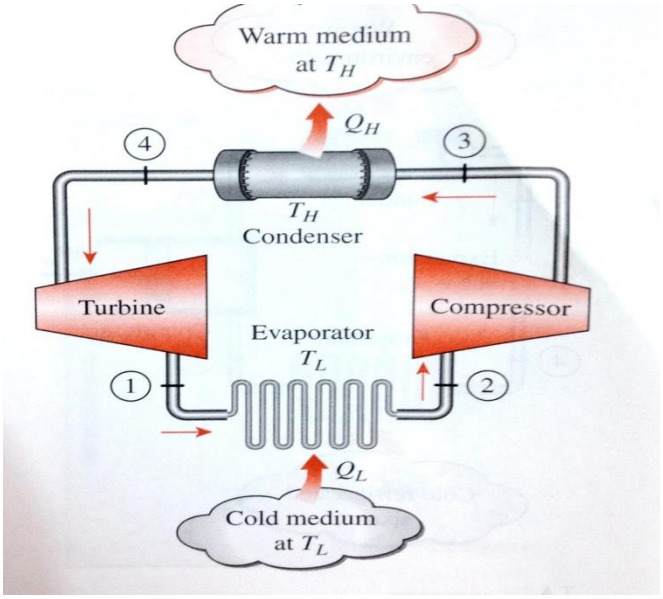
$$Thermal\ efficiency = \frac{Q_1 - Q_2}{Q_1} = 1 - \frac{Q_2}{Q_1}$$

$$= 1 - \frac{T_1(S_B - S_A)}{T_2(S_B - S_A)} = 1 - \frac{T_{min}}{T_{max}}$$

Carnot refrigeration cycle: -







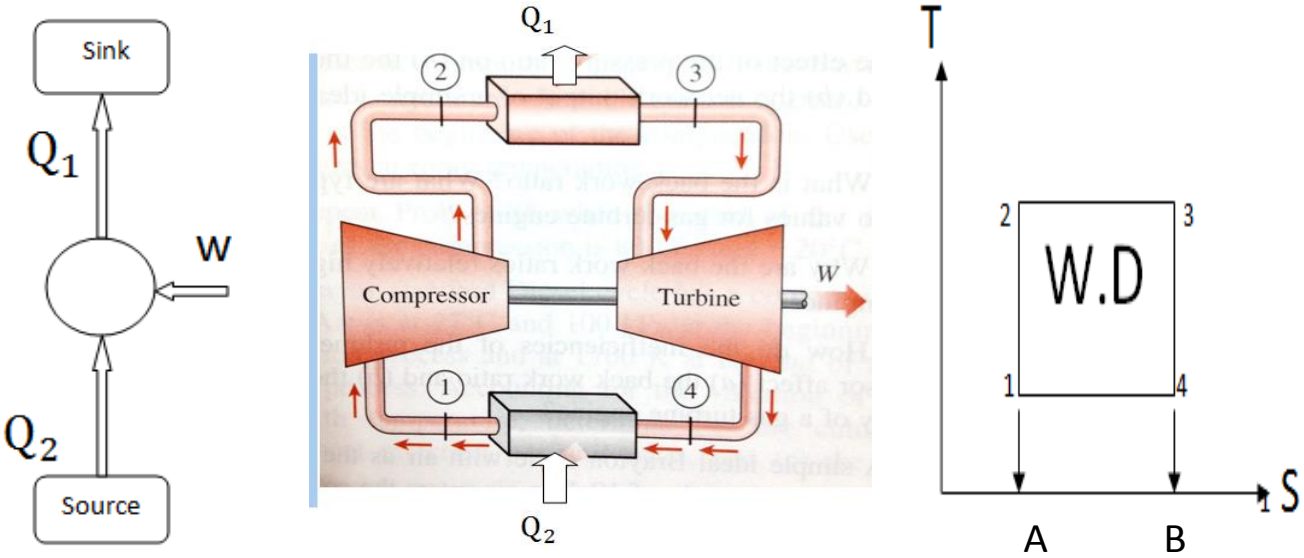
Let $Q_H = Q_{out} = Q_2$ *and* $Q_L = Q_{in} = Q_1$

Coefficient Of Performance (*COP*)

$$(COP) = \frac{usefual\ \text{refrigeration}}{work\ done} = \frac{Q_1}{Q_2 - Q_1}$$

$$= \frac{T_1(S_B - S_A)}{T_2(S_B - S_A) - T_1(S_B - S_A)} = \frac{T_1}{T_2 - T_1}$$

Carnot heat pump: -



Performance Factor (P.F)

$$(P.F) = \frac{Q_1}{Q_2 - Q_1}$$

$$= \frac{T_2(S_B - S_A)}{T_2(S_B - S_A) - T_1(S_B - S_A)} = \frac{T_2}{T_2 - T_1} + 1 - 1$$

$$= \frac{T_2 - T_2 + T_1}{T_2 - T_1} + 1 = \frac{T_1}{T_2 - T_1} + 1 = COP + 1$$