6.1 Reversed Carnot Cycle:

Reversed Carnot cycle is shown in Fig.6.1. It consists of the following processes.

Process a-b: Absorption of heat by the working fluid from refrigerator at constant low temperature T_2 during isothermal expansion.

Process b-c: Isentropic compression of the working fluid with the aid of external work. The temperature of the fluid rises from T_2 to T_1.

Process c-d: Isothermal compression of the working fluid during which heat is rejected at constant high temperature T_1.

Process d-a: Isentropic expansion of the working fluid. The temperature of the working fluid falls from T_1 to T_2.

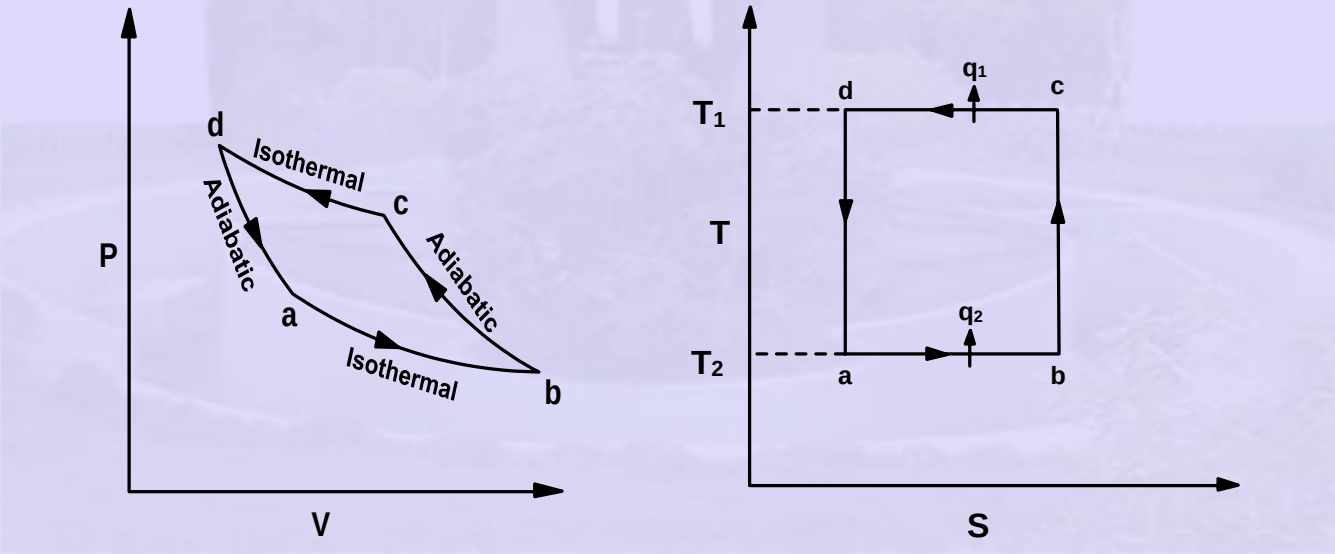

Fig.6.1. Reversed Carnot cycle

COP of Refrigerator:

$$COP = \frac{\text{Heat absorbed}}{\text{Work supplied}} = \frac{\text{Heat absorbed}}{\text{Heat rejected - Heat absorbed}}$$

$$= \frac{T_2(s_b - s_a)}{T_1(s_b - s_a) - T_2(s_b - s_a)} = \frac{T_2}{(T_1 - T_2)}$$

Practically, the reversed Carnot cycle cannot be used for refrigeration purpose as the isentropic process requires very high speed operation, whereas the isothermal process requires very low speed operation.