Date 29/Oct/2021
Sem III Unit-IV

## Temperature entropy Diagram

Carnot cycle in TS diagram →

This deg diagram clearly represent the transfer of heat. During the reversible isothermal expansion AB, the working substance expands expands from A to B absorbing heat at carnot temperature $T_1$, with increase in entropy from $S_A$ to $S_B$. During The reversible adiabatic expansion from B to C, The entropy ($S_B$) remains constant. The substance does work at the cost of internal energy and the temperature drops from $T_1$ to $T_2$.

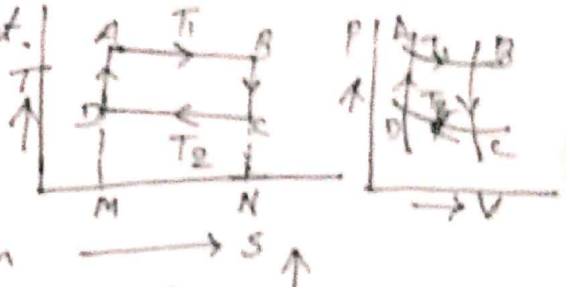


Fig T-S (Temperature entropy) diagram and P-V (Pressure volume diagram)

During the reversible isothermal compression from C to D, heat is rejected at constant temperature $T_2$ untill the entropy, $S_B$ reduce to $S_A$. During the adiabatic compression from D to A, entropy ($S_A$) remains remains constant. The internal energy increase to more to temperature to $T_1$ from $T_2$.

Thus a cycle of operation is completed.

Now heat observed during expension AB

$$= \text{Area } ABNM = T_1(S_B - S_A)$$

and heat rejected during compression CD

$$= \text{Area } CDMN = T_2(S_B - S_A)$$

Heat observed or rejected during BC or DA is zero.

Here heat utilized = area $ABCD = (T_1 - T_2)(S_A - S_B)$ and thermal