Thermodynamics :-

① $\Delta Q = \Delta U + W$

② $W = PdV$

③ $\Delta Q = mL$

($L \rightarrow$ latent heat)

④ $\Delta Q = ms\Delta T$

⑤ $\Delta Q = nc\Delta T$

⑥ $\Delta U = U_2 - U_1$

⑦ $\Delta U = \frac{f}{2} nR\Delta T$

⑧ $C_v = \frac{fR}{2}$

⑨ $C_p = C_v + R$

⑩ For isothermal process,

$$W = nRT \ln\left(\frac{V_f}{V_i}\right)$$

$$* \; W = -2.303\, nRT \log_{10}\left(\frac{V_f}{V_i}\right)$$

$$* \; \frac{dP}{dV} = -\frac{P}{V}$$

(11) For adiabatic process

* $\Delta U = -W = \frac{nR\Delta T}{\gamma - 1}$

* $\frac{dP}{dV} = -\frac{\gamma P}{V}$ $\{ PV^{\gamma} = C$, $TV^{\gamma-1} = C$, $\frac{P}{T^{\gamma}} = C$

(12) Carnot Engine - Pg 74 - Arihant book

(13) $C_v = \frac{R}{(\gamma - 1)}$

(14) specific heat capacity of water $= 4.184\ J\ g^{-1}\ K^{-1}$

Heat

(1) $\frac{\text{temp.} - \text{freezing point}}{\text{no. of units}}$

(2) $q = nC\Delta T$
$q = mC\Delta T$

(3) $q = mL$
$L \rightarrow$ latent heat

(4) $\frac{\Delta Q}{t} = K\Delta T$

(5) $C_p - C_v = R$

(6) $\mathcal{E} \propto T^4$ ← temp.

$\mathcal{E}$ → energy released per second per unit area

emmisivity (for a body which is NOT black body)

$$\mathcal{E} = \sigma T^4 \quad \Big\} \quad \mathcal{E} = e\sigma T^4$$

σ → Stefan- Boltzman constant

$\sigma = 5.67 \times 10^{-8}\ W m^{-2} K^{-4}$

(7) $\Delta l = \alpha L_0 \Delta T$

$\alpha : \beta : \gamma = 1 : 2 : 3$

(8) $\rho_1 = \frac{\rho}{1 + \gamma\Delta T}$

(9) $V_0 = V(\gamma_l - \gamma_c)\Delta T$

(10) $F_{B_1} = F_B \frac{(1 + \gamma_s \Delta T)}{(1 + \gamma_l \Delta T)}$

(11) $\Delta\rho = \rho(1 - \gamma\Delta T)$