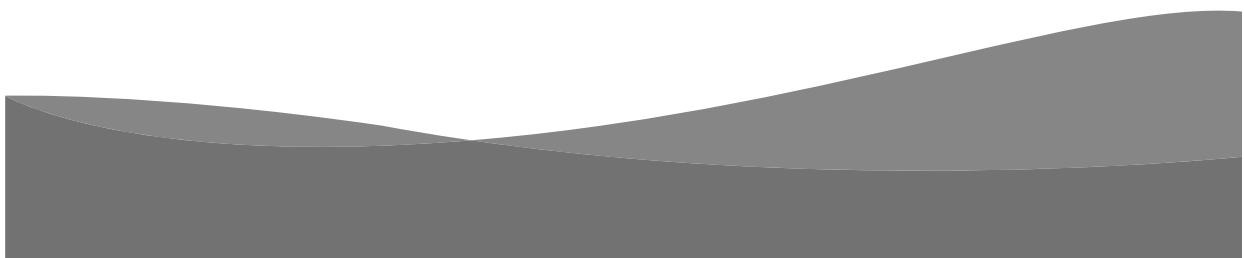


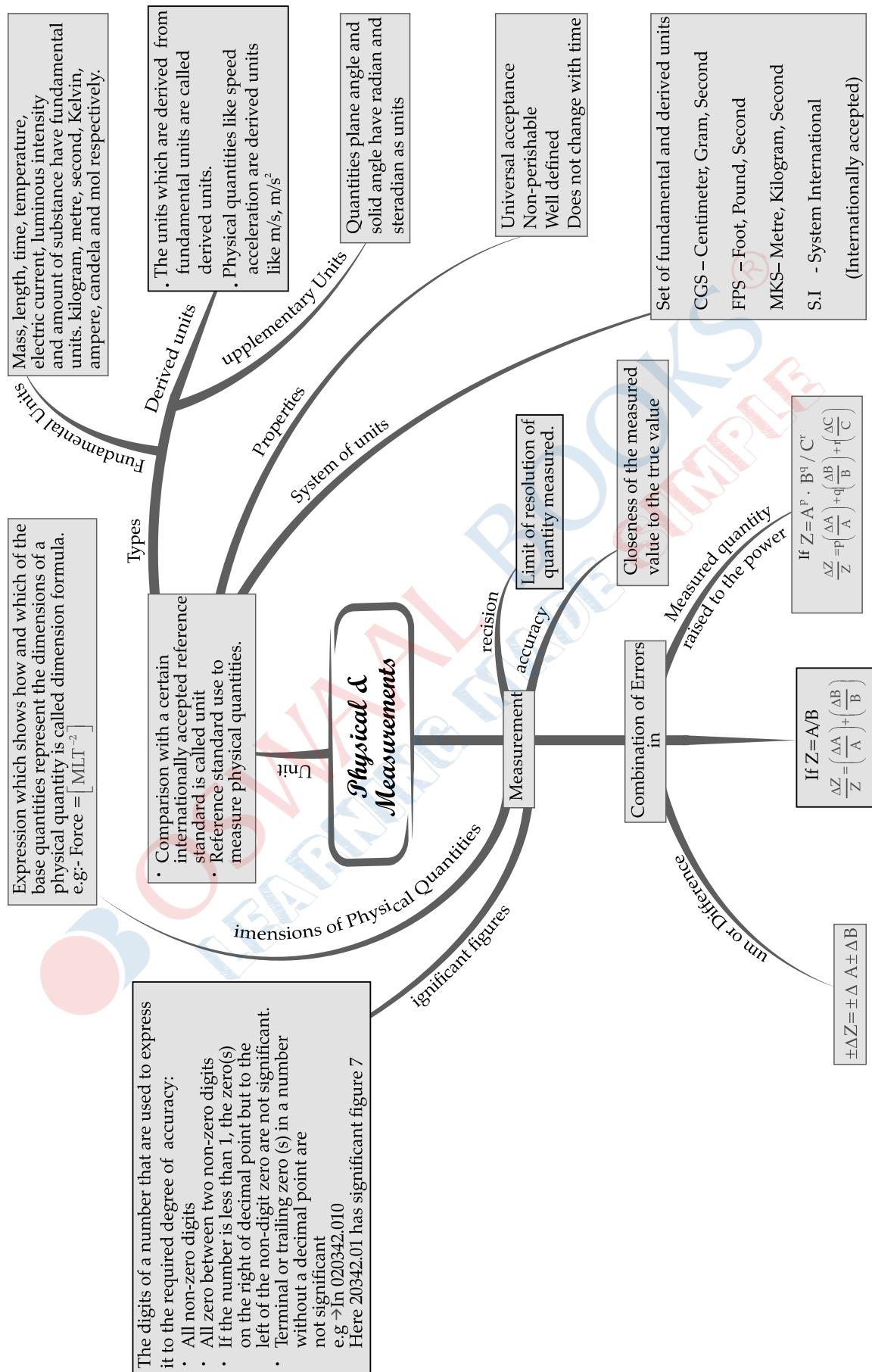
PHYSICS

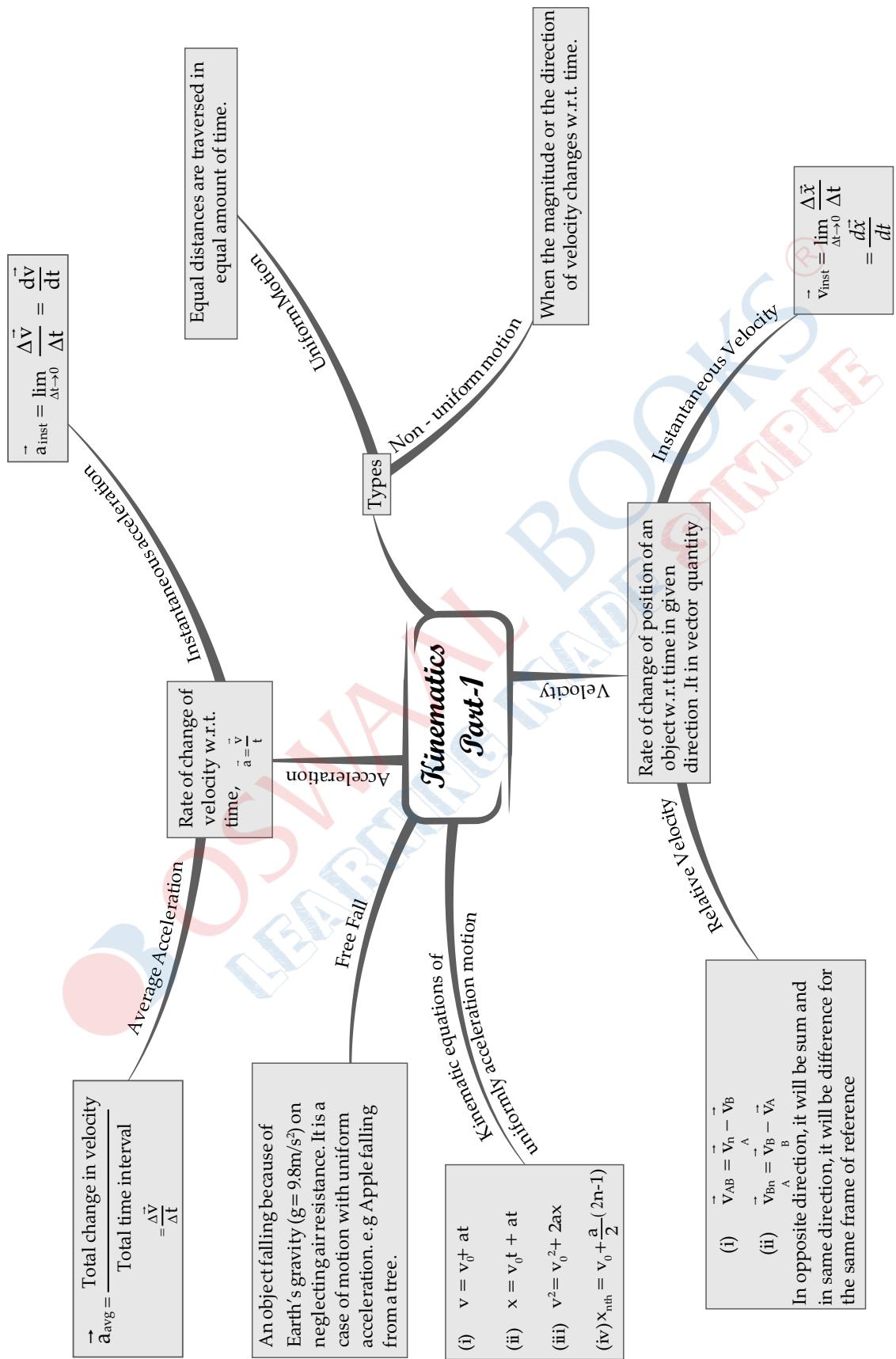
MIND MAPS

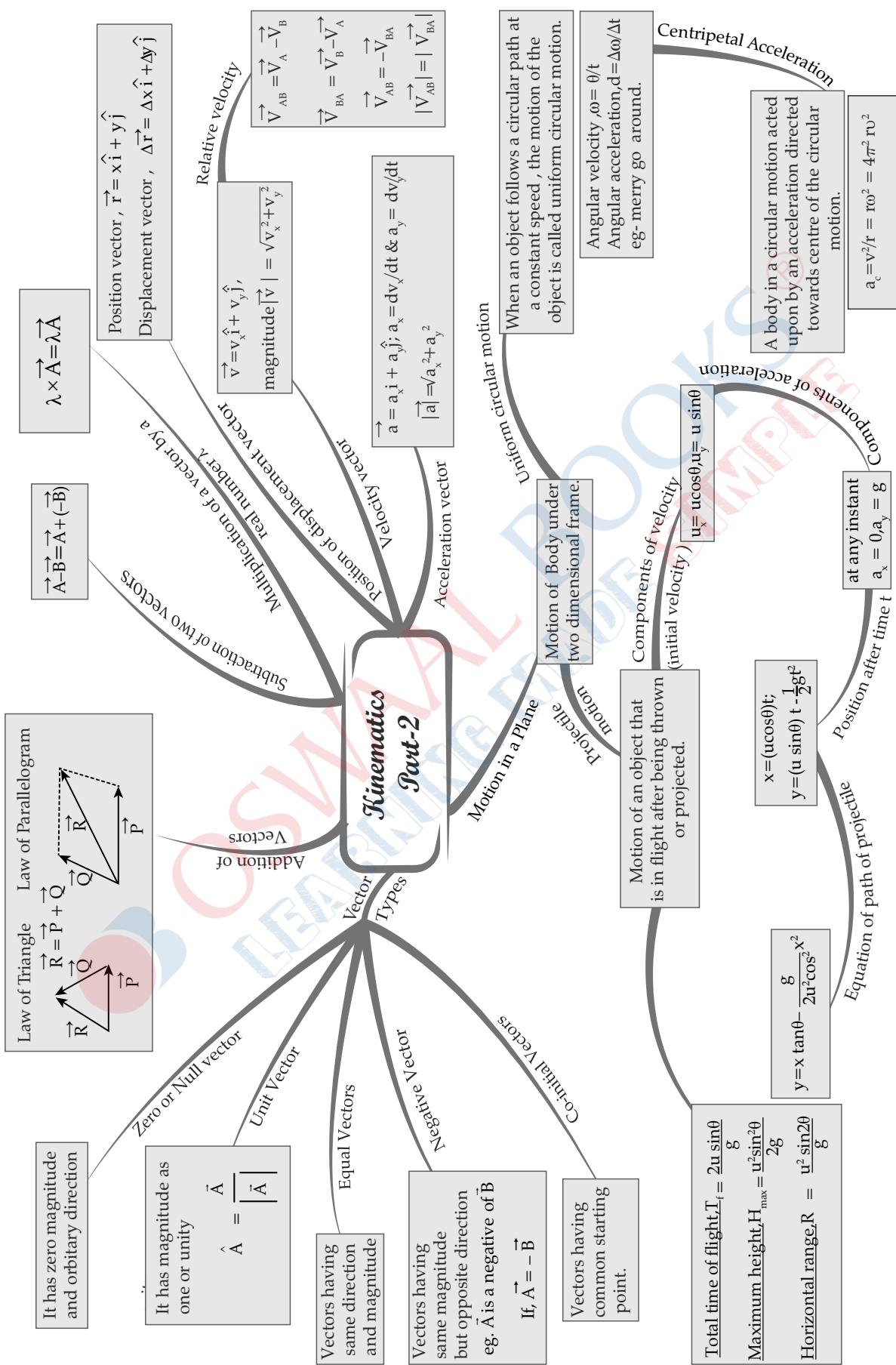
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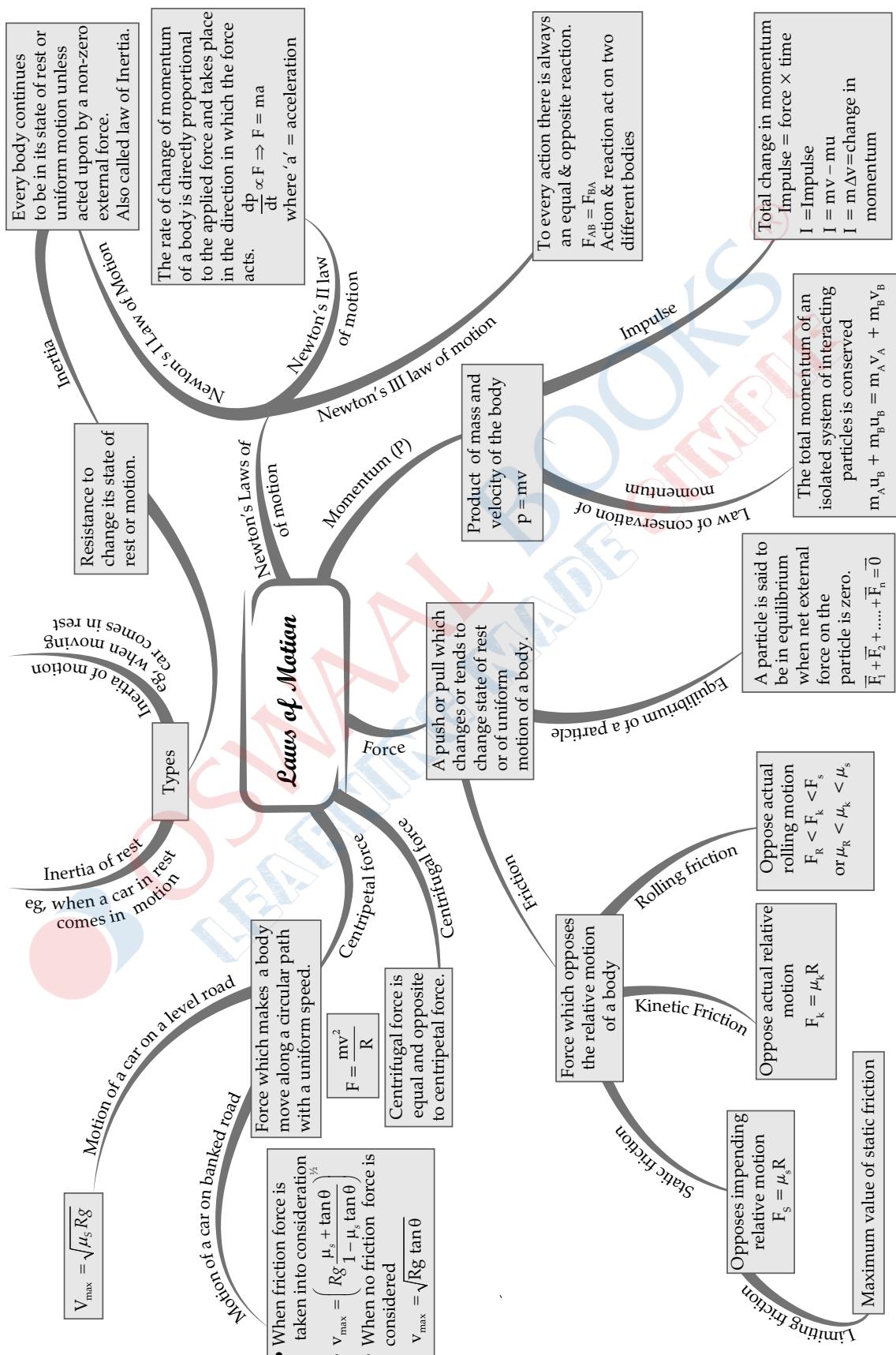
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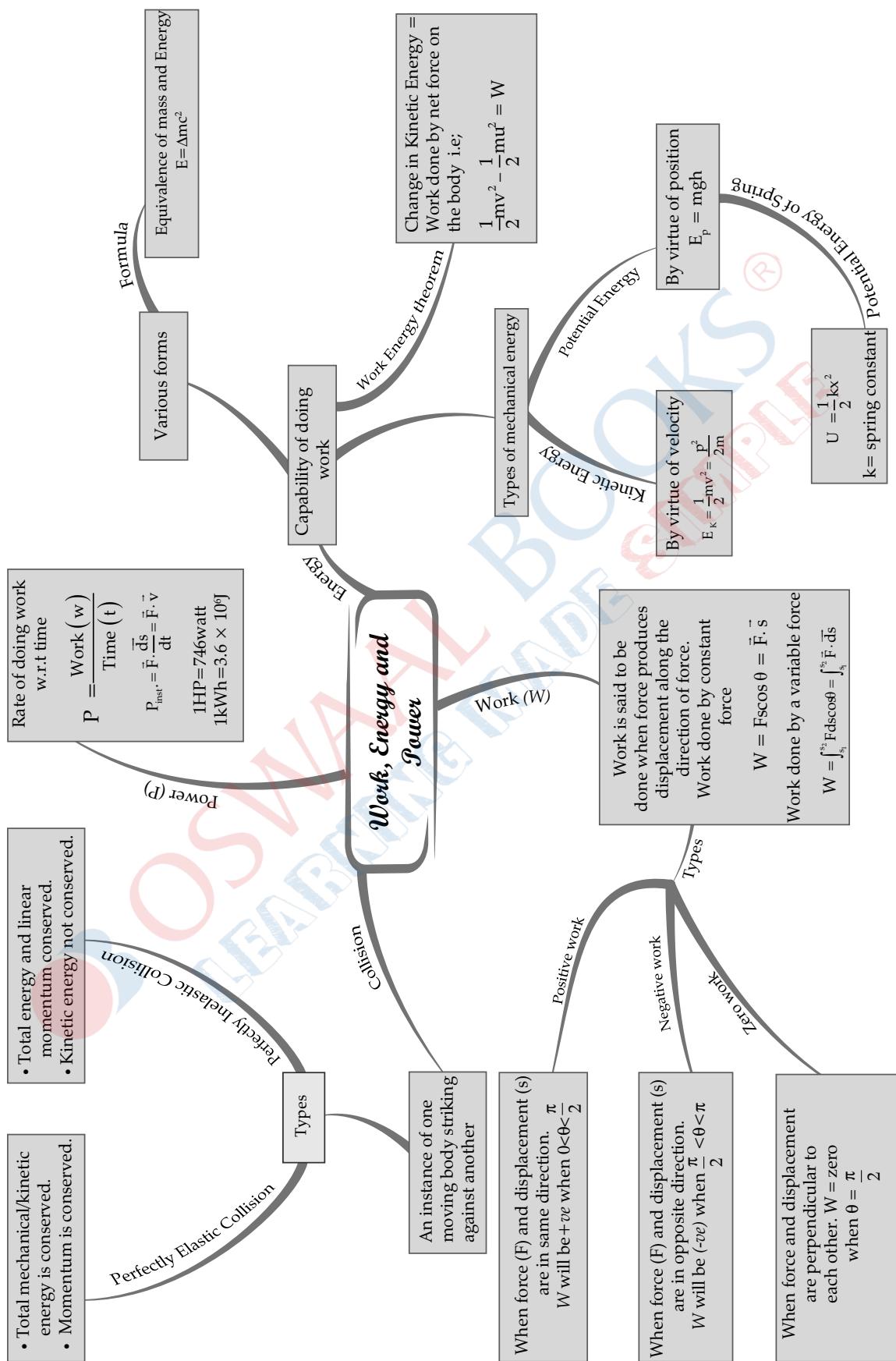


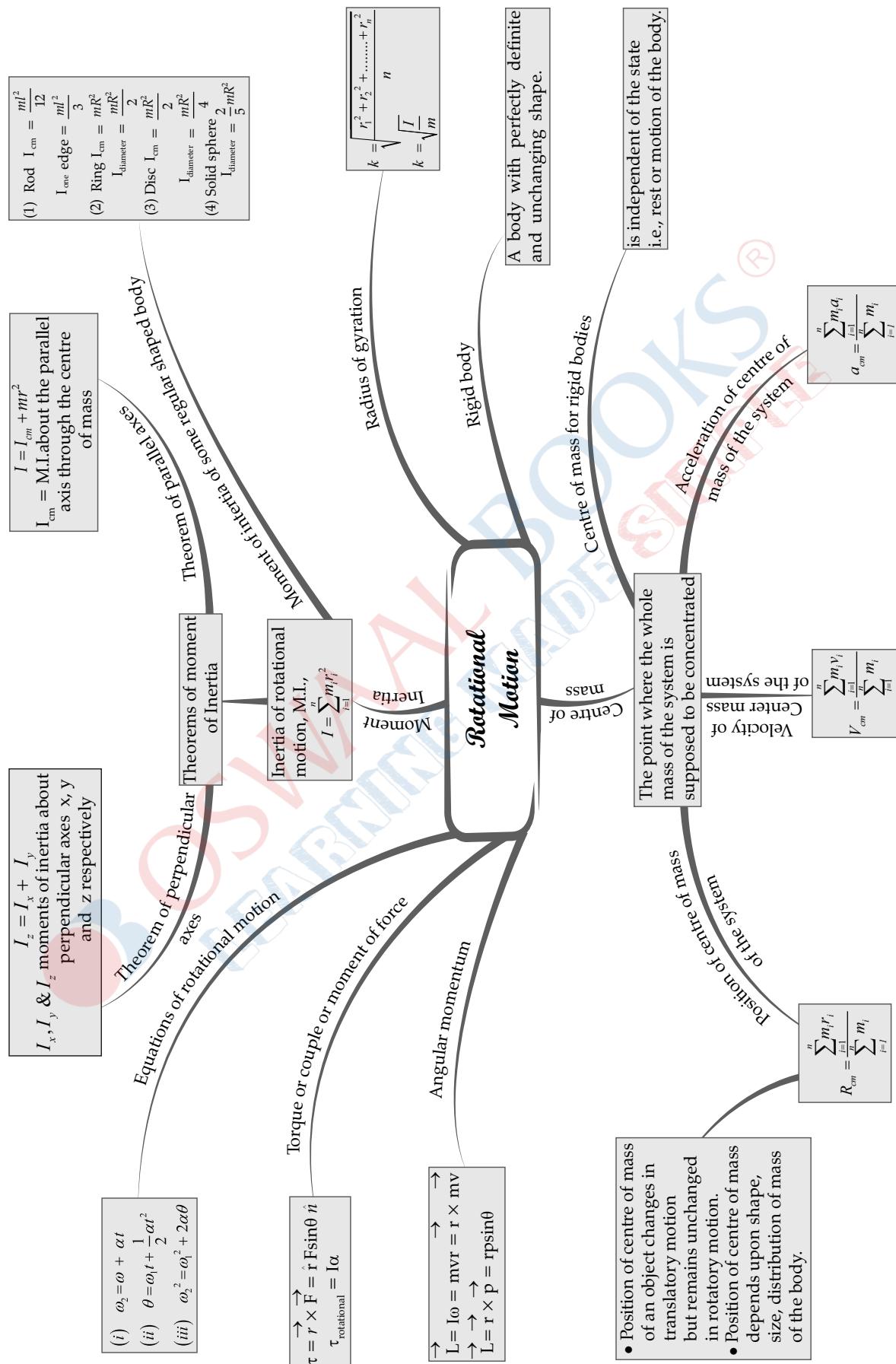


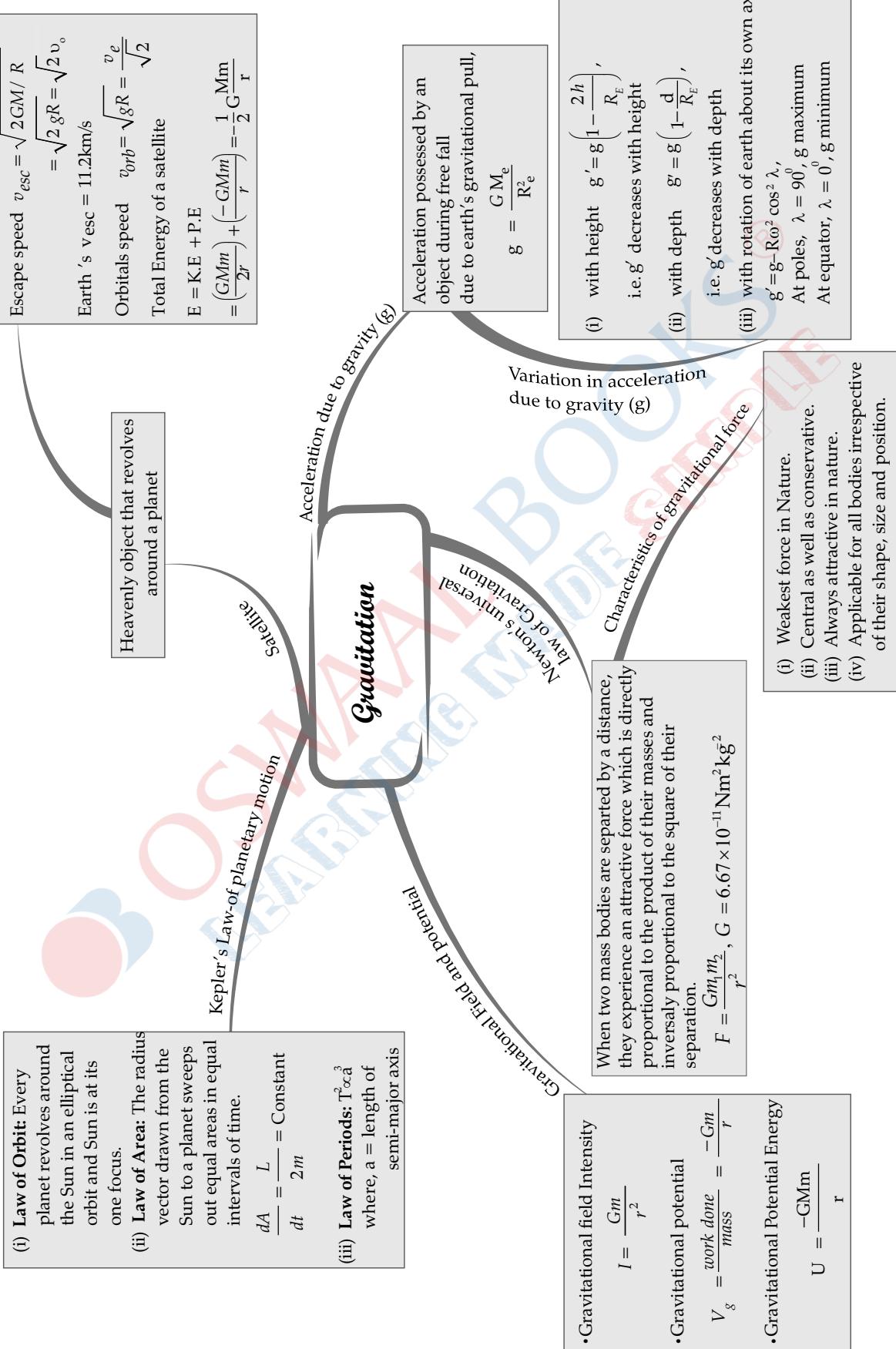


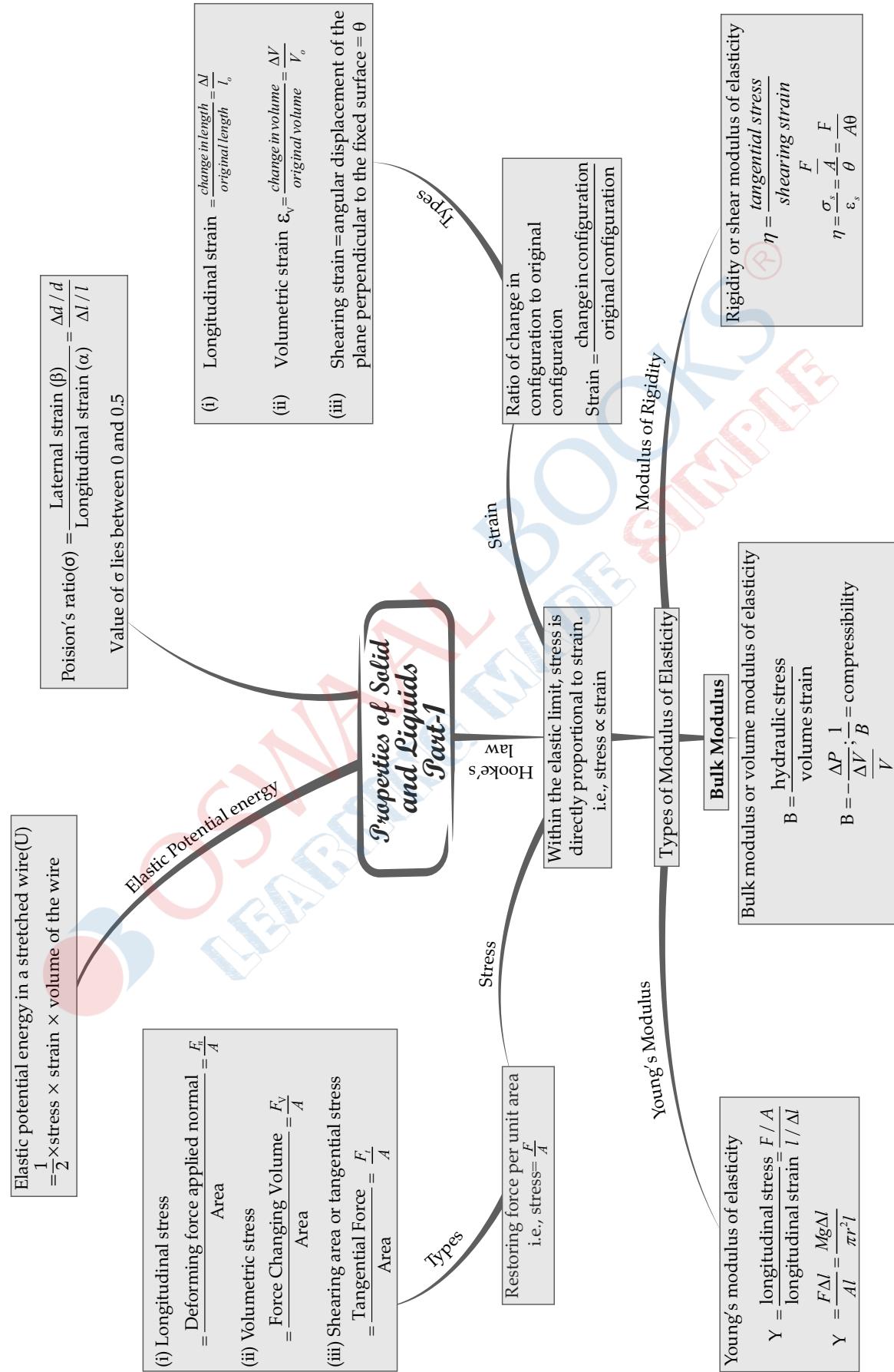


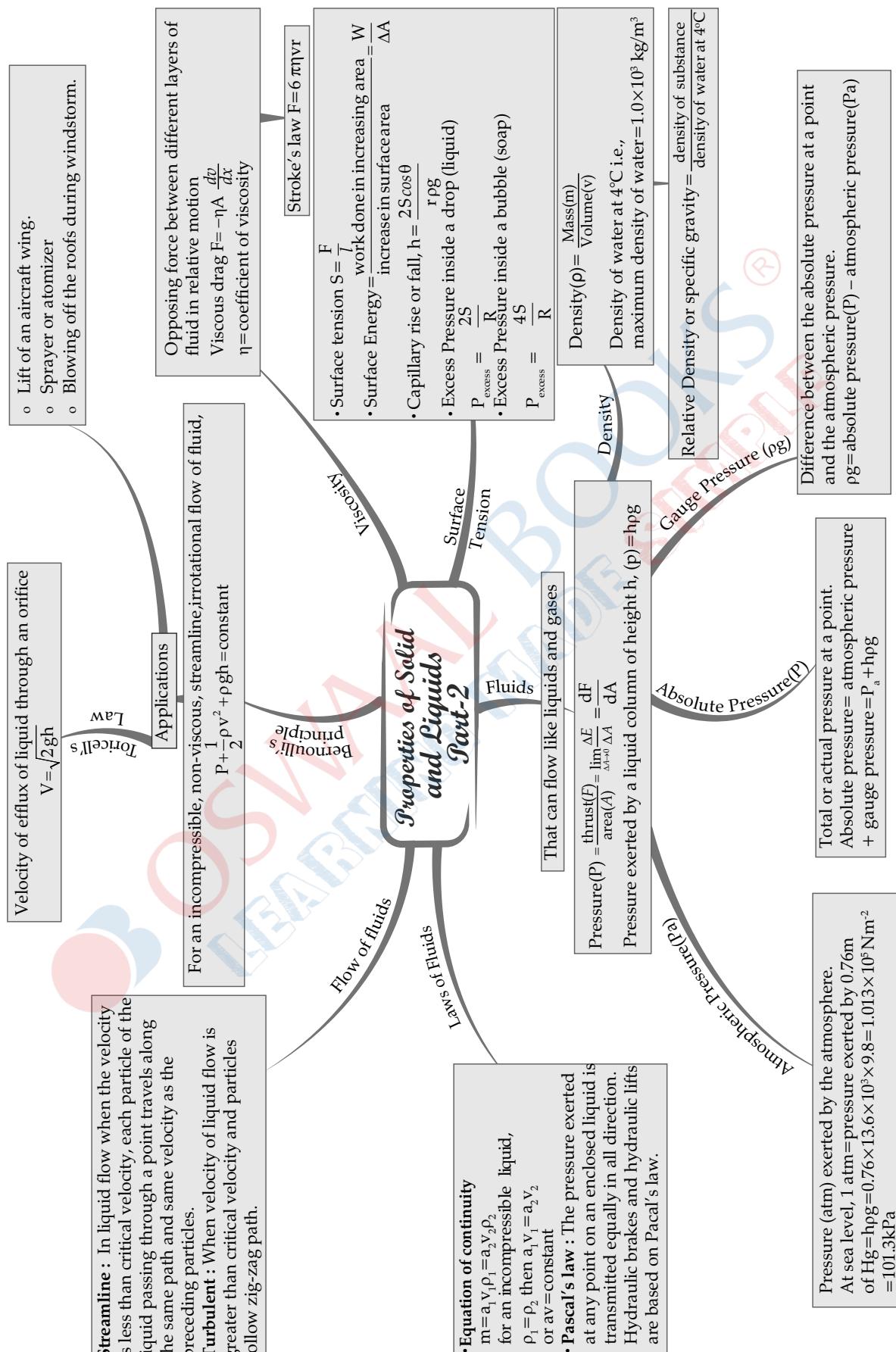


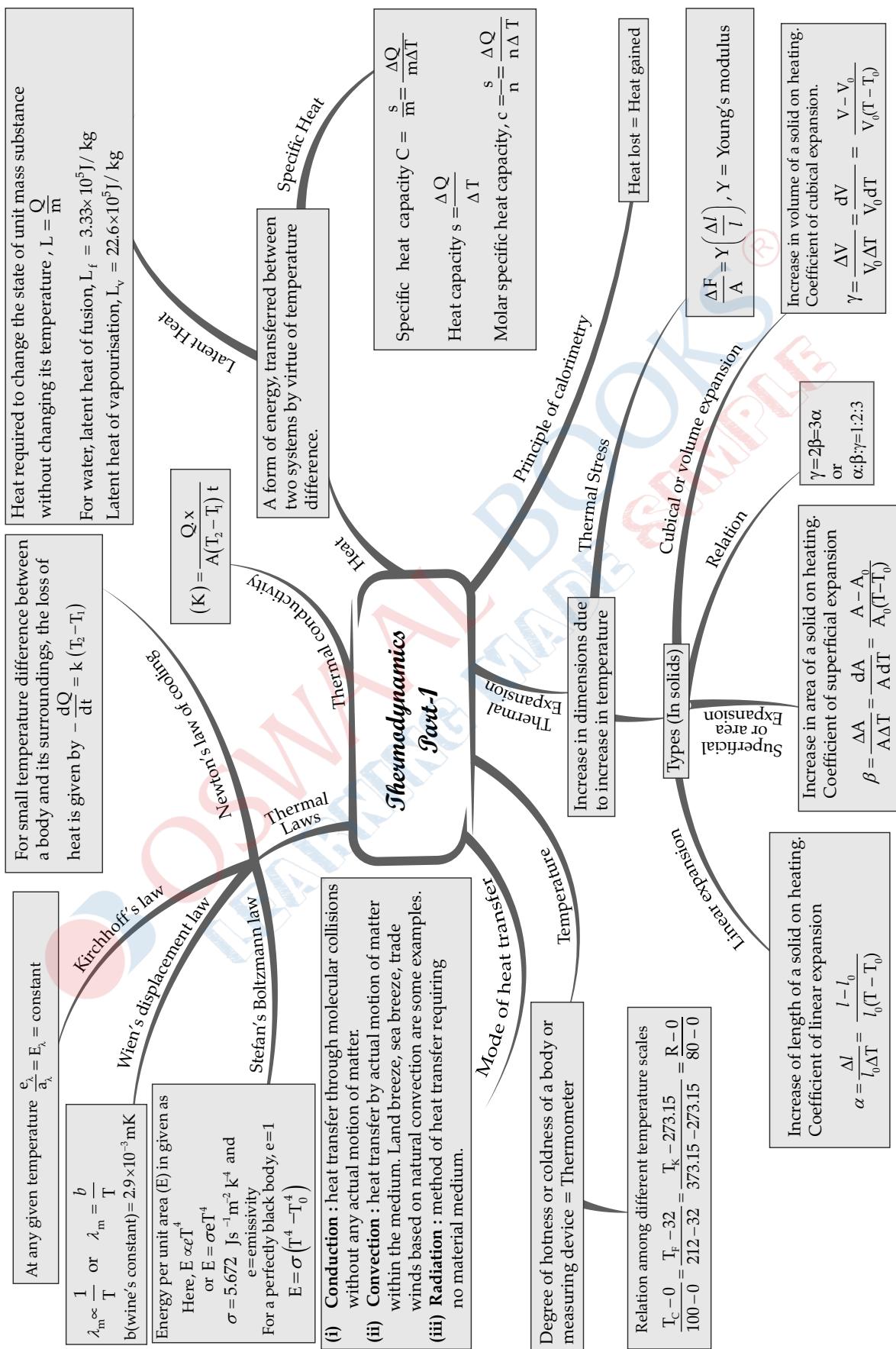


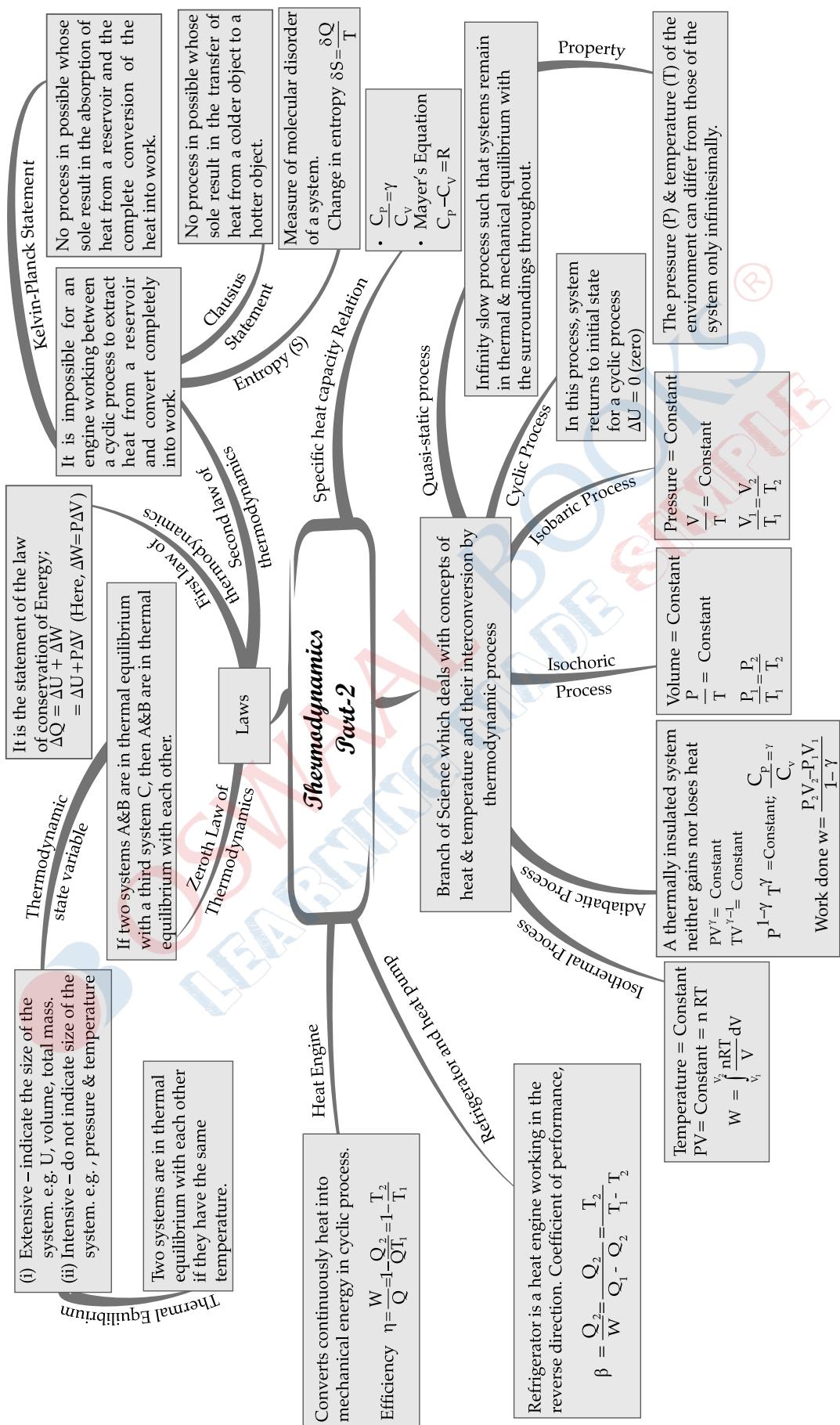


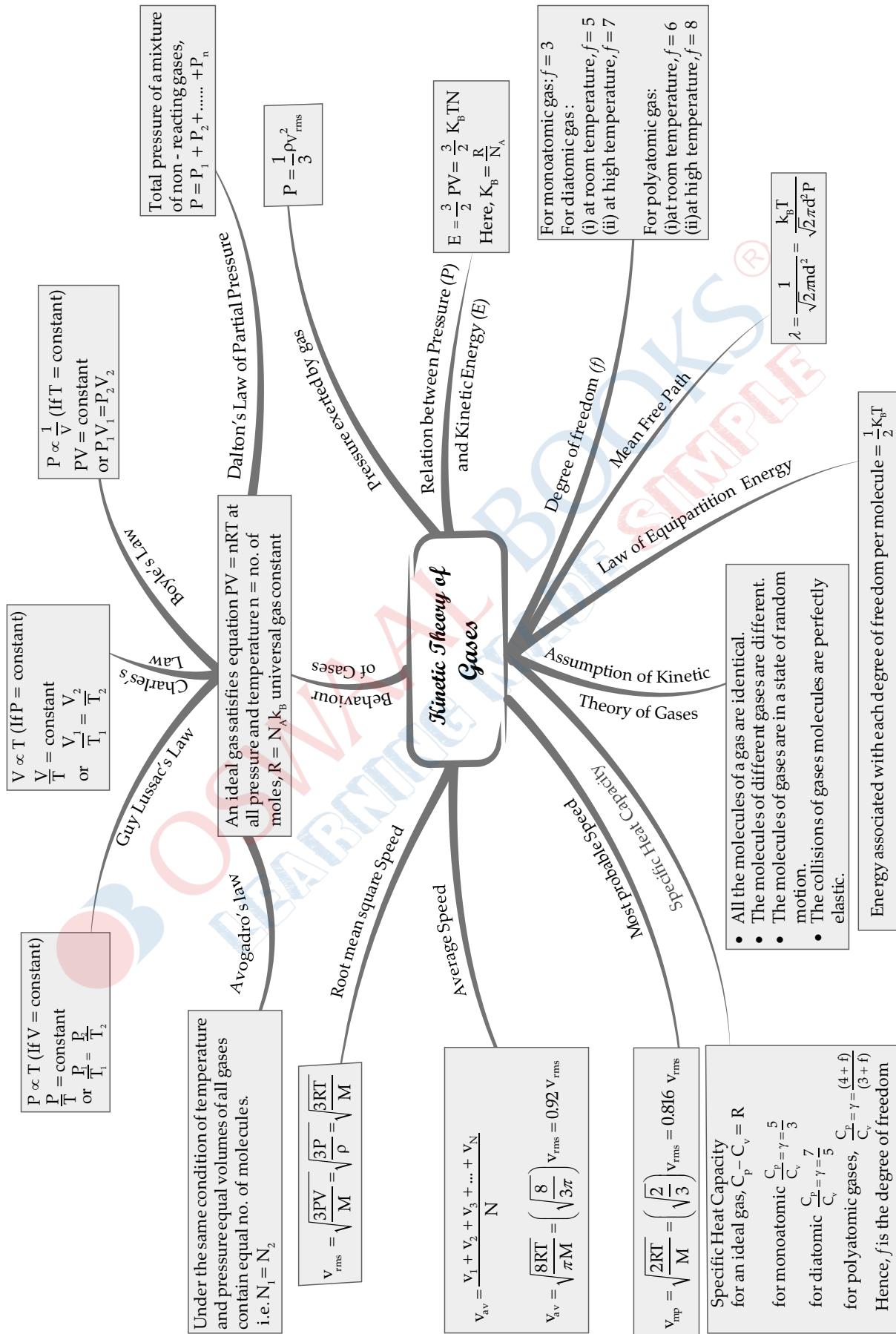


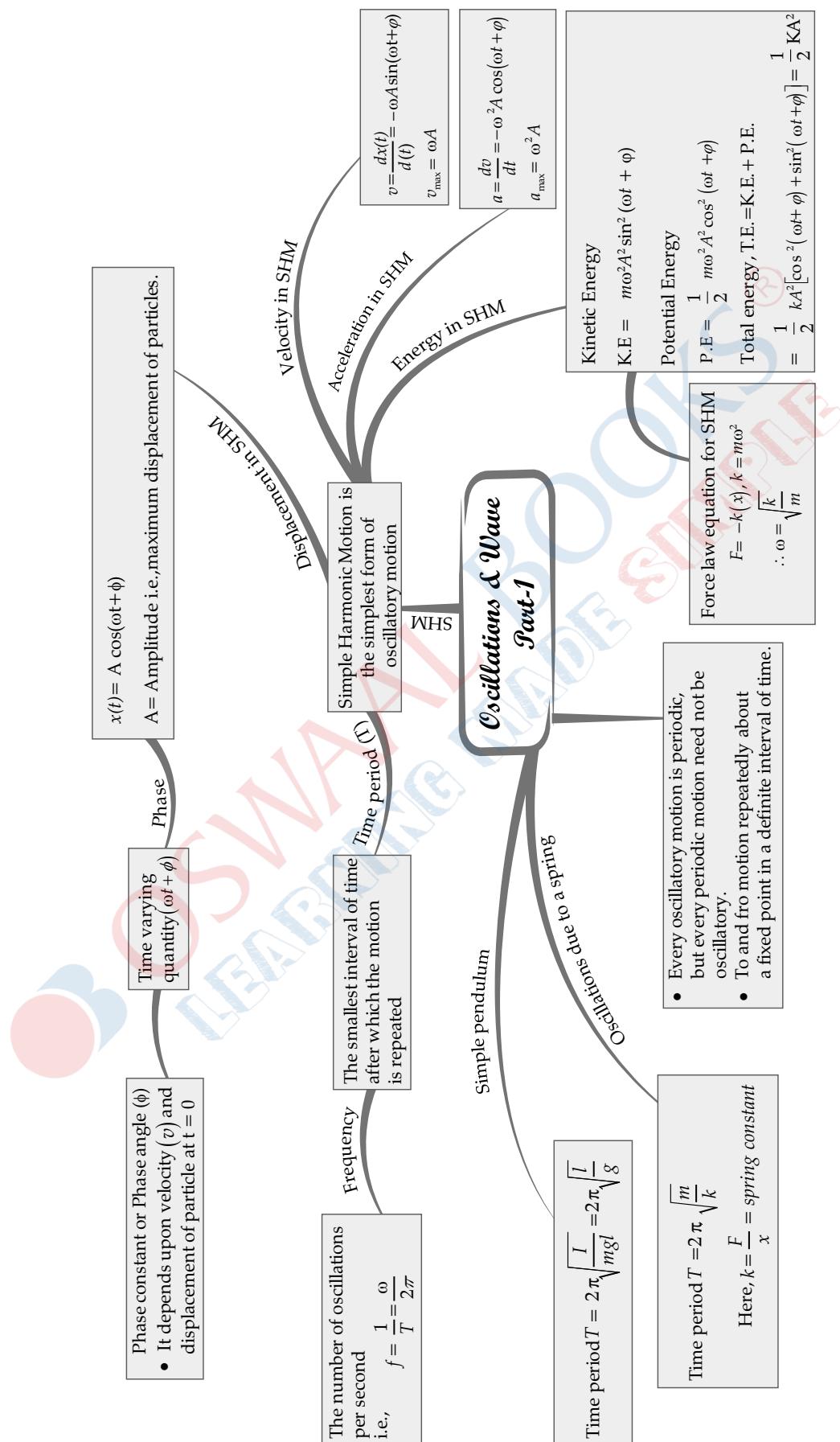


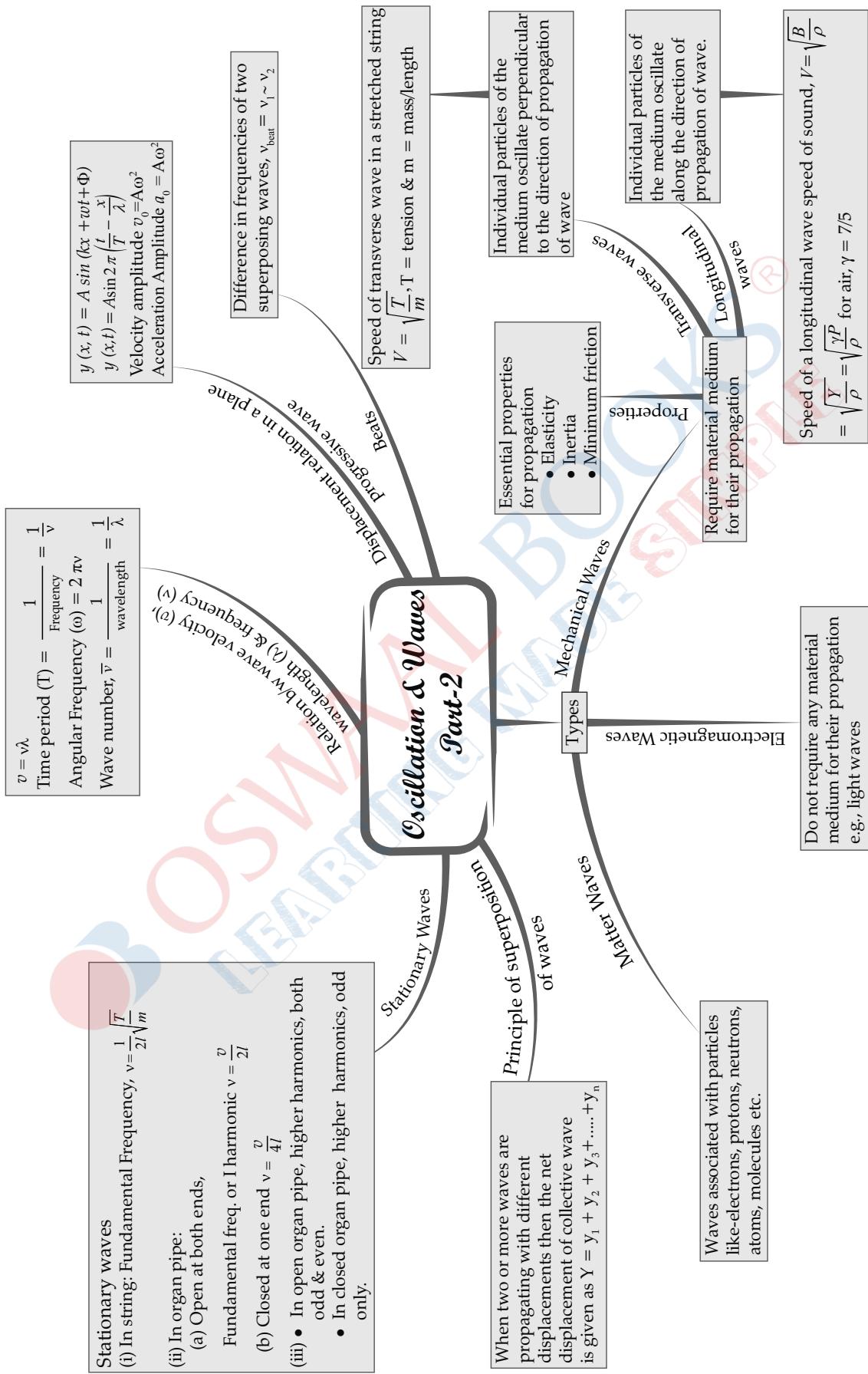


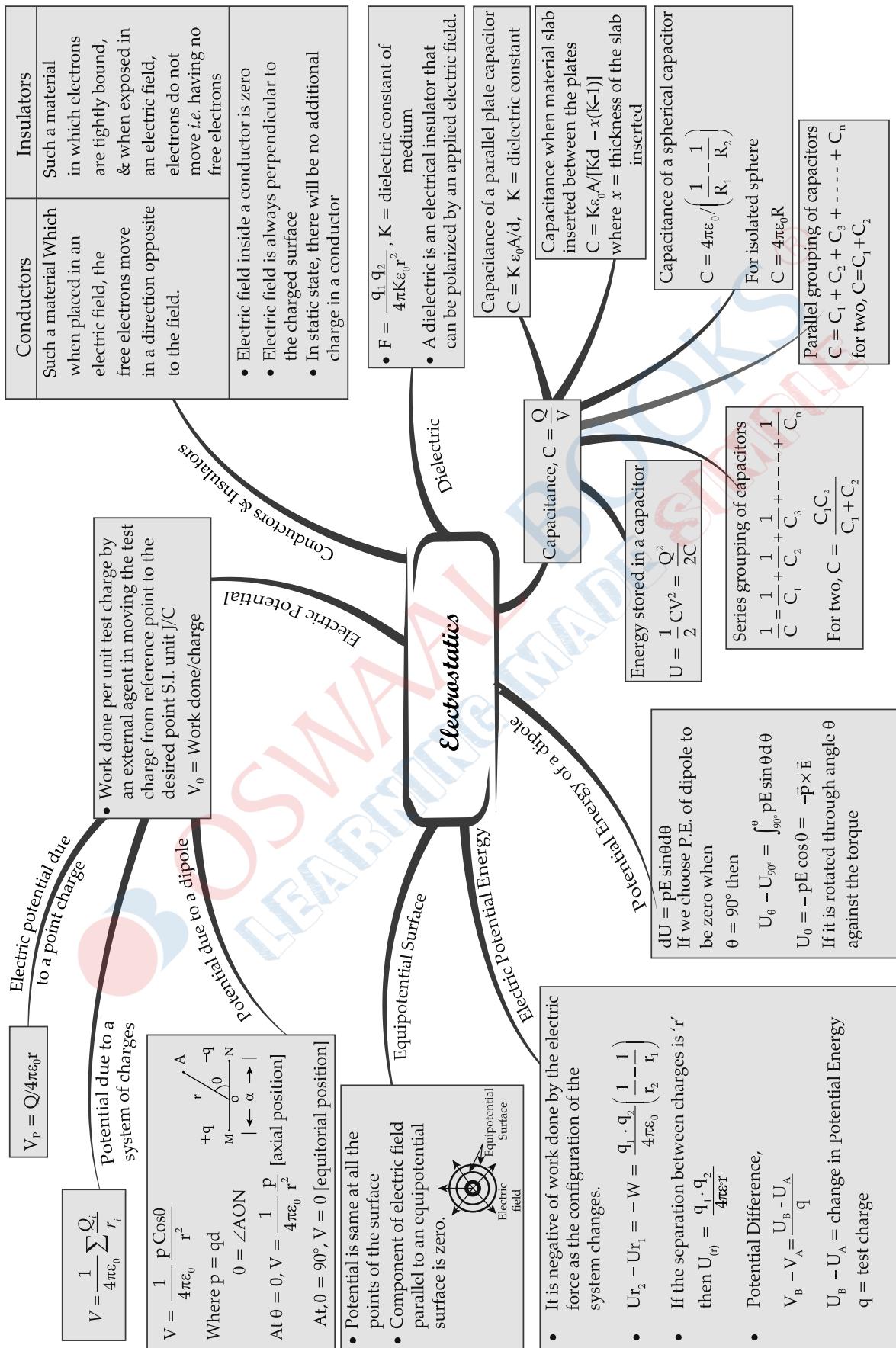


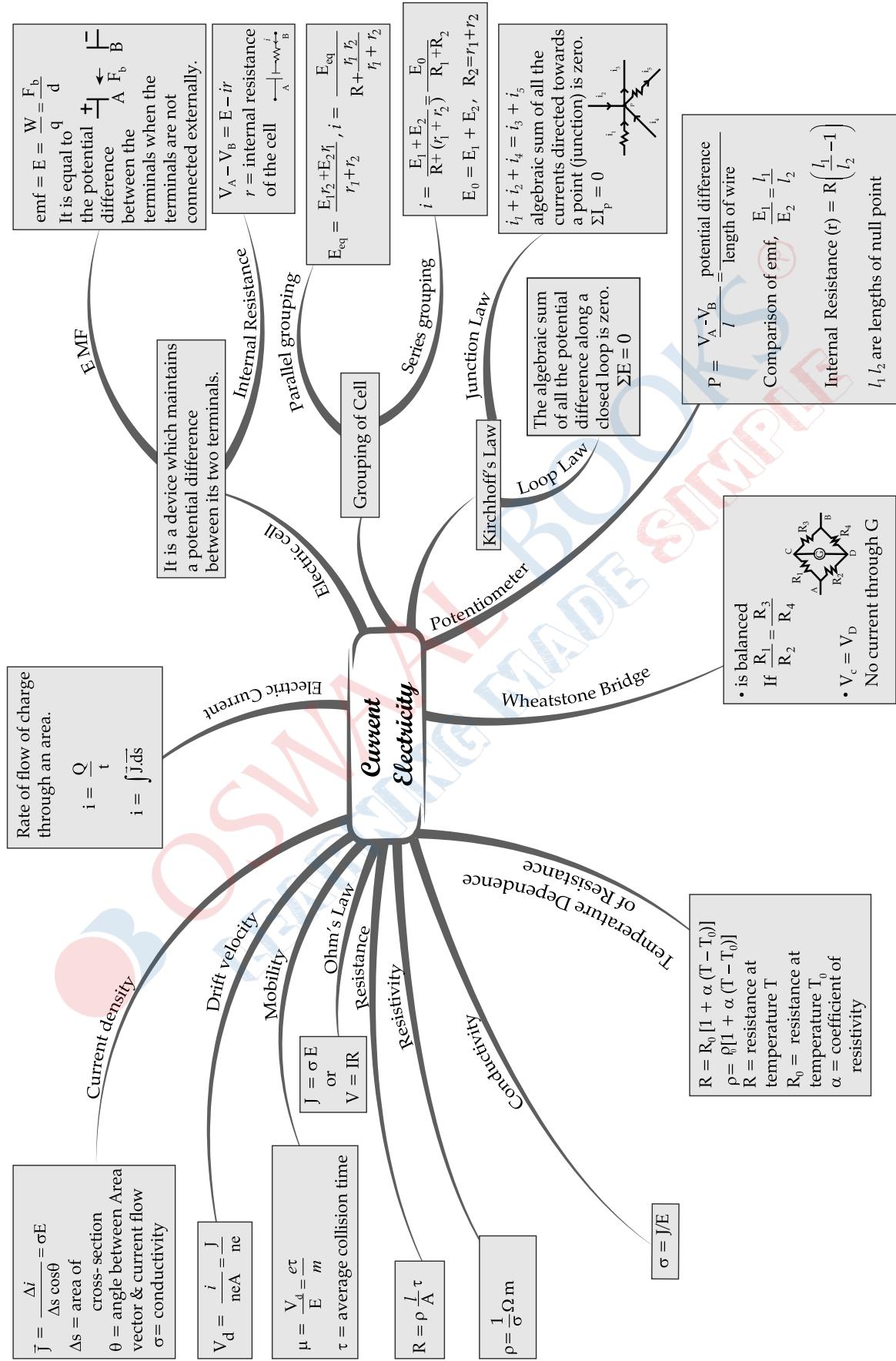


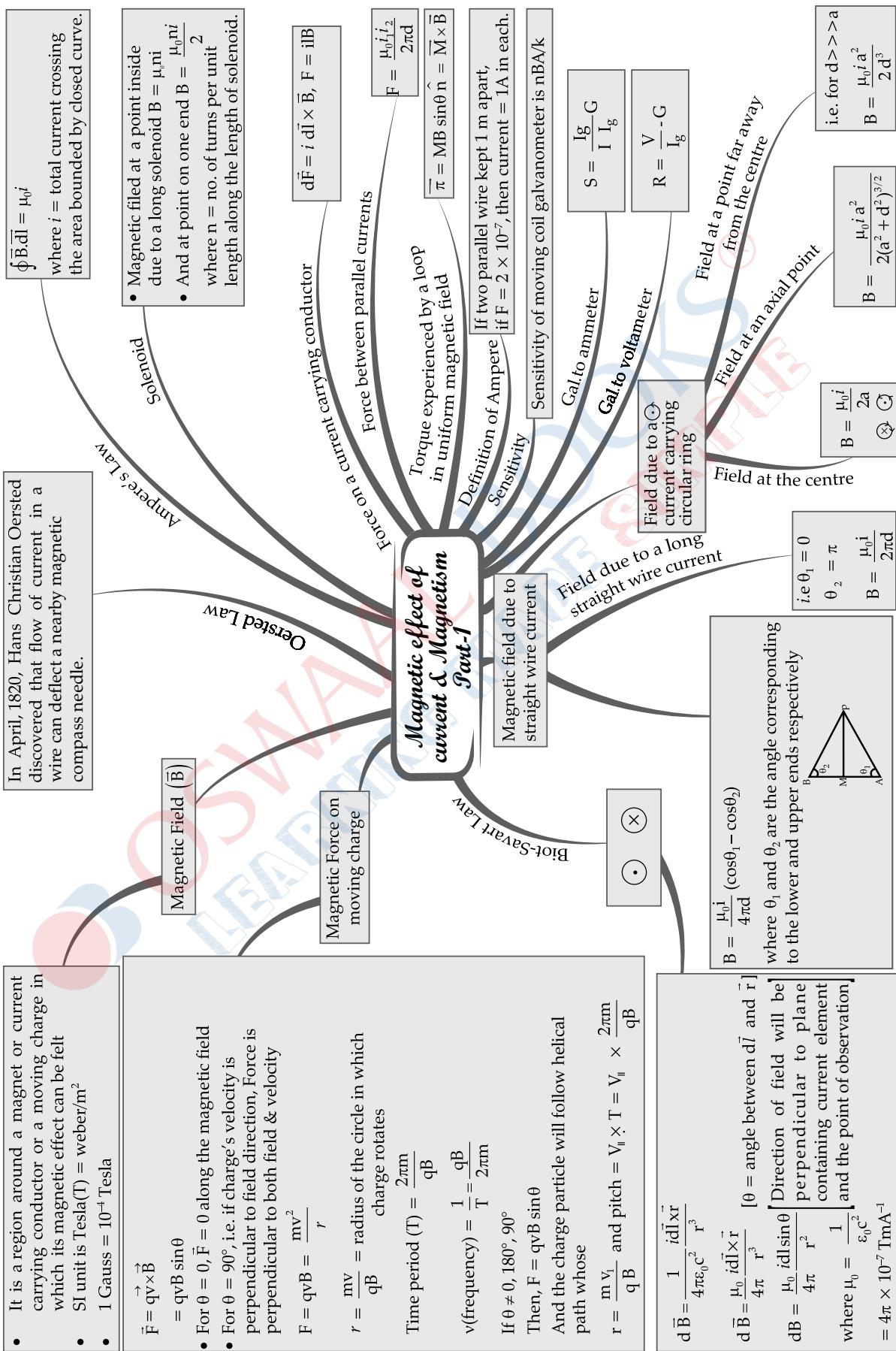


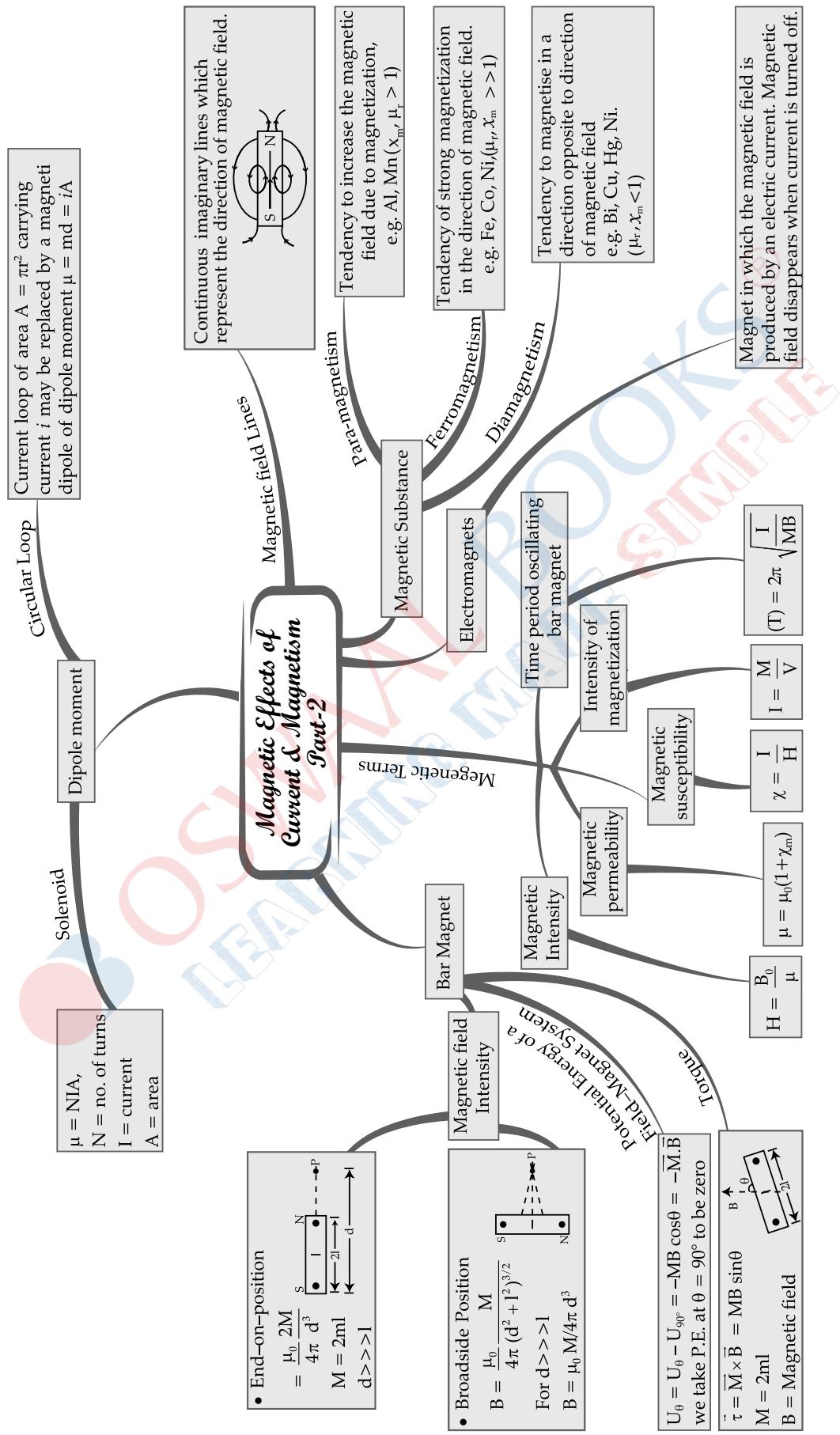


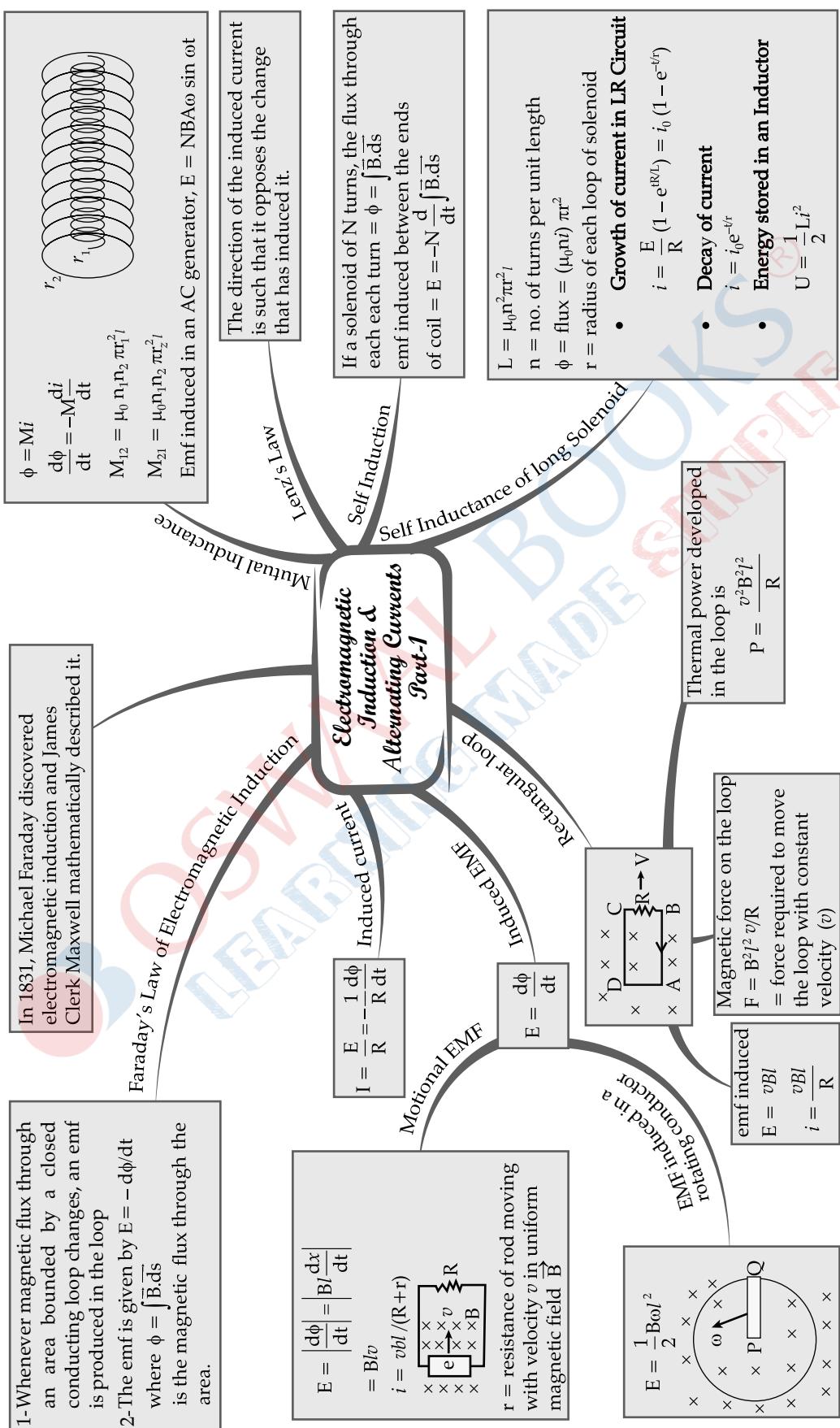


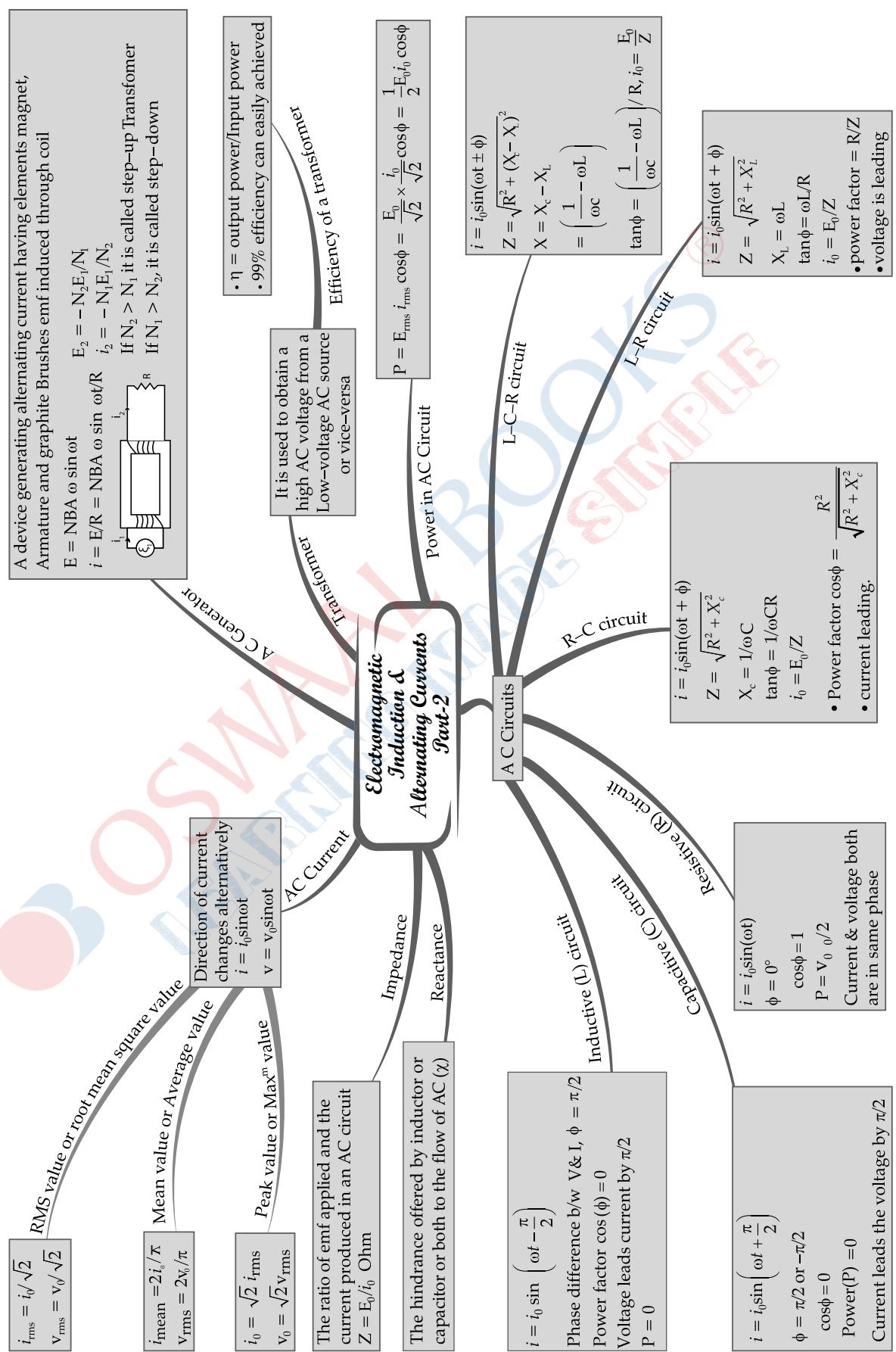


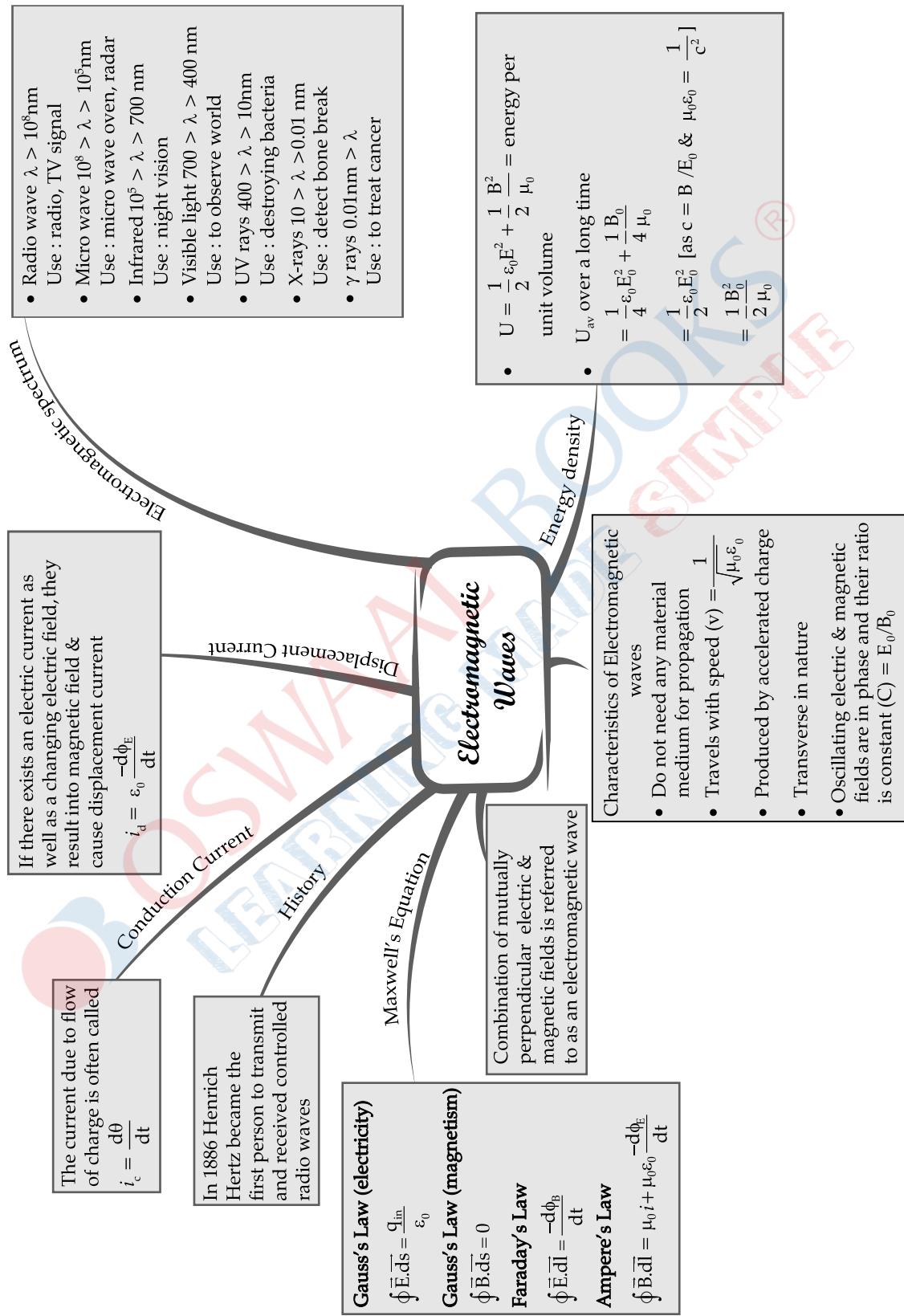


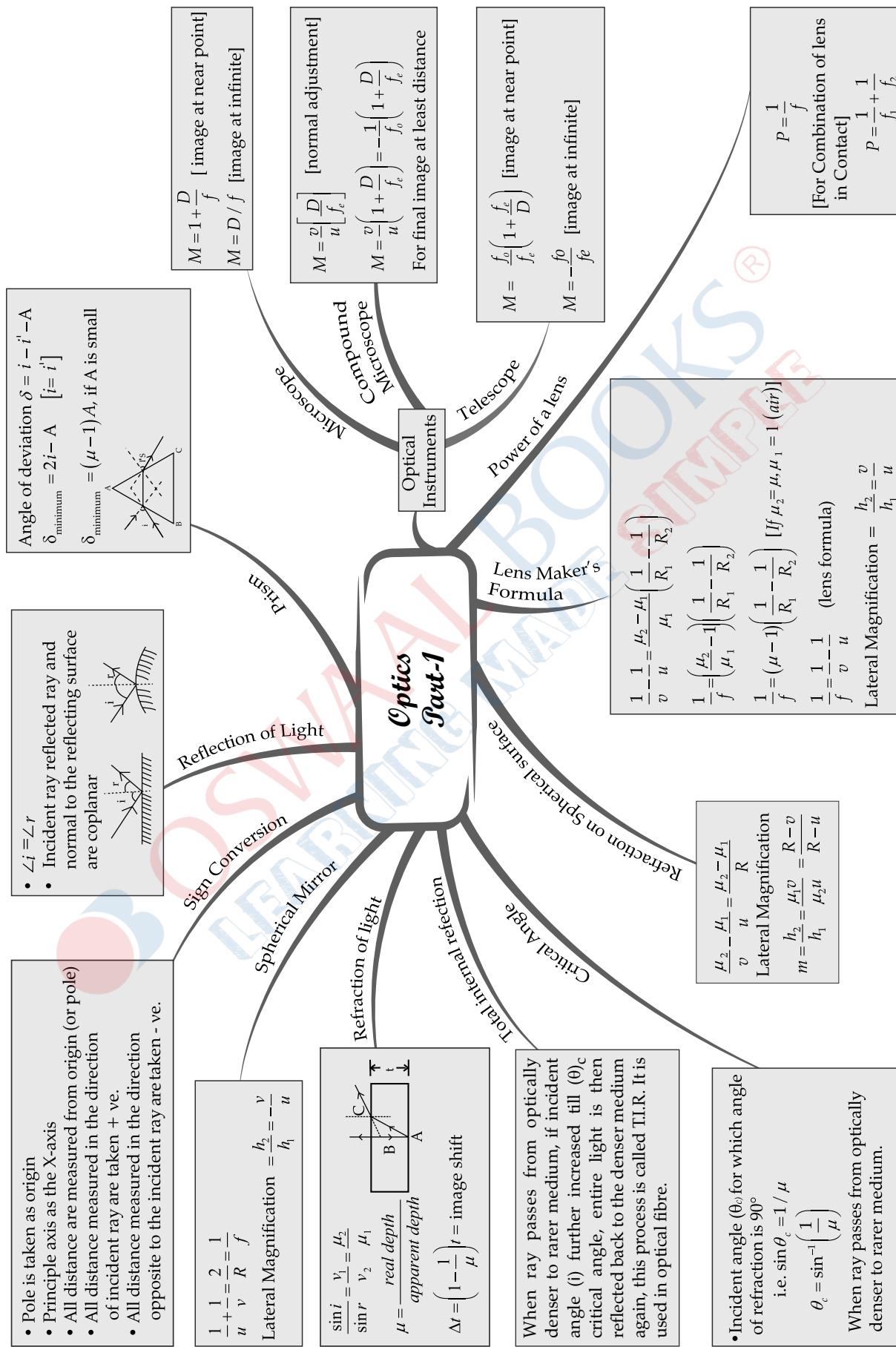


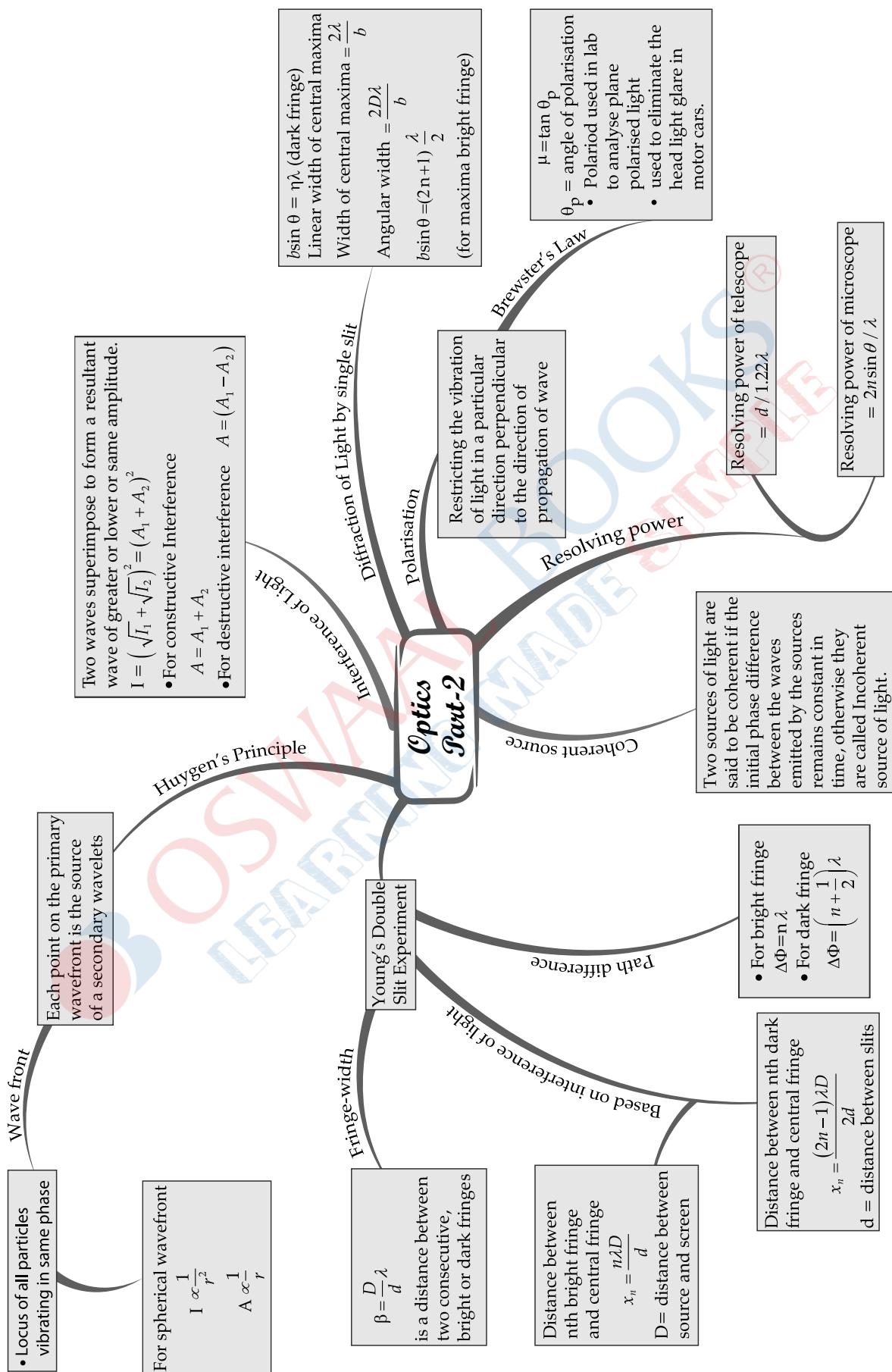












*Dual Nature of
Matter & Radiation*

- Light has both wave character as well as particle
- Interference can be explained by wave nature
- When light is of sufficiently low wavelength, it behaves as particle
- Light particles having definite energy and definite linear momentum are called "photons"
 - Energy of each photon = $h\nu = hc/\lambda$
 - Momentum of each photon = $h\nu/c = E/c$

Einstein, after an average academic career put forward quantum theory of light in 1905 while working as a grade III technical officer in a patent office.

All matter can exhibit wave-like behaviour e.g. beam of electrons can be diffracted like a water wave

$$\lambda = \frac{h}{mv} = \frac{h}{\sqrt{2mK_{max}}}$$

A beam of electrons emitted by electron gun is made to fall on nickel crystal cut along cubical axis at a particular angle. Scattered beam of electrons is received by detector.

Results : $\lambda = \text{de Broglie's wavelength}$

$$\begin{aligned} &= h/p \\ &= 1227/\sqrt{v} \text{ nm} \\ &= 1227/\sqrt{54} \text{ nm} \\ &= 0.167 \text{ nm} = 1.67 \text{ \AA} \end{aligned}$$

This experiment verifies the wave nature of electrons & relation with de-Broglie wavelength.

- If $\lambda = \lambda_0 = hc/\phi$
 $K_{\max} = 0$, i.e.
 Electron may just come out.
- If $\lambda > \lambda_0$
i.e. $E < \phi$
 no electron will come out
- If $\lambda \leq \lambda_0$.
 Photoelectric effect takes place this λ_0
 λ_0 = depends on metal used

- $K_{max} = E - \phi = eV_0$
 $= \frac{hc}{\lambda} - \phi, \quad V_0 = \text{stopping potential}$

K_{max} = maximum kinetic energy
of elected electrons

Hore, $\lambda_0 = hc/\phi$

λ_0 = Threshold Wavelength
 $\lambda_0 = c/\nu_0 = \phi/h$
 λ_0 = Threshold frequency
 $K_{max} = \lambda(\nu - \nu_0)$

- When light of sufficient small wavelength is incident on metal surface, electrons are ejected from the metal, the phenomenon is called photoelectric effect.
- Ejected electrons are called photoelectrons
- Minimum energy equal to work function (ϕ) must be given to an electron so as to bring it out of the metal

