CH: Wave Motion

- Define and understand progressive wave
- ***Write progressive wave in mathematical form***
- Discuss the condition under which stationary waves can be formed
- Write stationary wave in mathematical form
- Calculate frequency, amplitude, velocity, time period, etc. of progressive wave
- ***Find expression for stationary wave using two progressive waves***

Waves:

Waves are the disturbances that transport energy from on point to another without the actual transportation of the matter.

As a wave travel (propagate) from one point to another in a medium, the particles (atoms or molecules) within the medium move simple harmonically (to- and- fro) about their mean position (*without actual transfer of particles*).

Types of waves:

1) **Non- mechanical wave (*Electromagnetic wave*):**
   The wave which needs no material medium for propagation is called as non- mechanical wave (*they can travel through the vacuum of space).*
   The electromagnetic wave is the only non- mechanical wave.
   They transmit energy as electric and magnetic field vectors (*i.e., in the form of electric and magnetic energy*).
   Examples: light waves, heat radiation etc.
   All non- mechanical waves are transverse in nature.
2) **Mechanical waves (*Elastic wave*):**
   The wave which needs material medium for propagation is called as mechanical wave.
   They also transmit energy and momentum in the medium (*but not in the form of electric and magnetic fields vector*).
   Examples: sound waves, water waves, string wave etc.
   Mechanical waves can be either longitudinal or transverse in nature.

Longitudinal VS Transverse wave:

Longitudinal wave	Transverse Wave
1) Particle of the medium vibrate parallel to the direction of propagation of wave.	1) Particle of the medium vibrate perpendicular to the direction of propagation of wave.
2) The wave transmits energy and momentum in the direction of propagation of wave	2) The wave transmit energy in the direction of propagation of wave (*but not the momentum*)
3) This wave causes the change in density of the medium	3) This wave does not cause the change in density of the medium
4) This wave propagates in all medium (solid, liquid, gases)	4) This wave propagates only in solid and on the surface of liquid
5) Wave propagates in the form of compressions and rarefactions	5) Wave propagates in the form of crests and troughs
6) For the propagation of longitudinal wave, the medium should possess Bulk modulus of elasticity.	6) For the propagation of transverse wave, the medium should possess shear modulus of elasticity.