



International House Tashkent Subject: Physics **Department: ES, Course 1** Lesson 11. Propagation of mechanical waves in various media





Types of Waves



Mechanical waves and electromagnetic waves

Some waves require a material substance called a *medium* through which to travel. Waves like this are called *mechanical waves*.

Examples: water waves, sound waves and seismic waves etc.

Electromagnetic waves require no medium through which to travel.

Example: radio waves, microwaves and light etc.



Types of Waves



• Transverse waves and longitudinal waves

In <u>transverse wave</u>, the direction in which the disturbances take place is at right angles to the direction of propagation of the waves.

In <u>longitudinal wave</u>, the disturbances take place in a direction parallel to the direction of propagation of the waves.







• **Progressive waves and stationary waves**

A wave which transmits energy from the source to the space surrounding the source is called a *progressive wave (travelling waves)*.

In certain conditions, waves energy is localized. When this happens, the waves are called <u>stationary waves</u> (standing waves).



Wave Equations



 In a sinusoidal wave, each particle undergoes simple harmonic motion about its equilibrium position. This gives the equation

$$y = A \sin \omega t$$

where $\omega = 2\pi f$

or
$$y = A \sin kx$$

where $k = 2\pi/\lambda$





- The graph shows how the displacement of one particle at a particular distance from the source varies with time.
- Graph of the equation $y = A \sin \omega t = A \sin \frac{2\pi t}{T}$





Variation of displacement with distance



- The graph shows the displacement of the vibrating particles at different distances from the source at a certain instant.
- Graph of the equation $y = A \sin kx = A \sin \frac{2\pi x}{\lambda}$





 The phase difference between two waves is the fraction of a cycle (in radians) by which one wave would have to be advanced or retarded to be in phase with the other. THAME





Propagation of Radio Waves



