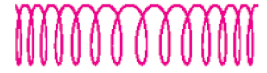


TRANSVERSE



1. WAVES

LONGITUDINAL



✂ IMP DEFINITIONS & FORMULAS ✂

TYPES OF WAVES

1. A **Wave** is described as a disturbance that travels in a medium or space.
A wave carries energy and information.

2. **Transverse waves** are formed when particles of the medium vibrate in perpendicular to the direction of wave propagation.

3. **Longitudinal waves** are formed when particles of the medium vibrate along the direction of wave propagation.

4. **Progressive waves** are formed when particles of the wave always move in one side direction.

5. **Stationary waves** are formed when two progressive waves travelling in opposite directions are super imposed.

5 CHARACTERISTICS OF WAVES

6. **Wavelength (λ)** is the distance between two successive crests or troughs of a wave.

7. **Frequency (ν or n)** is the number of waves that cross a wave point in unit time. $n = \frac{1}{T}$

8. **Period (T)** is the time taken by a particle in wave motion to complete one oscillation. $T = \frac{1}{n}$

9. **Velocity (V)** of
 - (i) progressive wave $V = n \lambda$ (or) $V = \frac{\lambda}{T}$
 - (ii) transverse wave $V = \sqrt{\frac{T}{\mu}}$, where T = tension and μ = linear density of the stretched string

10. **Phase (ϕ)** describes the position and direction of motion of a **particle** in the wave.

BULLET MASTER'S

PHYSI BEATS!

UNIT WISE DIVISION OF CHAPTERS OF SR. INTER PHYSICS[Wave Physics , Electricity , Magnetism, Atomic Physics , Semiconductor Physics]

- I) Wave Physics-I(3) : 1) Waves 2) Ray Optics 3) Wave Optics
- II) Wave Physics-II(3) : 11) Electro Magnetic Waves 12) Dual Nature 16) Communication system
- III) Electricity(4) : 4) Electric Charges 5) Electrostatic Potential 6) Current Electricity 10) AC
- IV) Magnetism(3) : 7) Moving Charges & Magnetism 8) Magnetism & Matter 9) EMI
- V) Atomic Physics(2) : 13) Atoms 14) Nuclei
- VI) Semiconductor Physics : 15) Semiconductors

☞ Second year Physics లో కొన్ని Chapters లోని వివిధ Topics ఒకేలా కనిపిస్తూ Overlapping జరుగుతూ కొంత Confusion Create చేస్తాయి. అందువల్ల అటువంటి వాటిని ఇలా 'యూనిట్ల వారిగా' విడగొట్టి చూస్తే ఆ Confusion కొంచెం తగ్గి Clarity పెరుగుతుంది.

NODES & ANTINODES

11. **Nodes** are always formed at closed ends.
12. **Antinodes** are always formed at open ends.
13. Distance between two successive nodes or antinodes is $\lambda/2$.
14. Distance between a node and its adjacent antinode is $\lambda/4$.

OPEN PIPES

15. When an **open pipe** is in fundamental mode
- (i) length of the open pipe $l = \frac{\lambda}{2} = \frac{v}{2f}$
- (ii) fundamental frequency $n_1 = \frac{v}{2l}$
- (iii) ratio of harmonic frequencies is 1:2:3

CLOSED PIPES

16. When a **closed pipe** is in fundamental mode
- (i) length of the closed pipe $l = \lambda/4$
- (ii) fundamental frequency $n_1 = \frac{v}{4l}$
- (iii) ratio of harmonic frequencies is 1:3:5

STRETCHED STRING

17. When a **stretched string** is in fundamental mode,
- (i) Length of the string $l = \frac{\lambda}{2}$
- (ii) Fundamental frequency $n_1 = \frac{v}{2l} = \frac{1}{2l} \sqrt{\frac{T}{\mu}}$
- (iii) Ratio of harmonic frequencies is 1:2:3

BEATS

18. **Beats** is the 'waxing and waning' caused by two sound waves of 'nearly equal frequency' and amplitude travelling in the same direction.
19. **Beat frequency** $n_{\text{beat}} = n_1 \sim n_2$

DOPPLER EFFECT IN SOUND

20. **Doppler effect** is the change in observed frequency and actual frequency due to relative motion between source and observer.

BULLET MASTER'S**PHYSI BEATS!****1) WAVES [1 LAQ]**

This first Chapter **WAVES** is the most 'Musical Chapter' in Physics.


Melodious 'Musical sound waves' come from **Flute, Clarinet, Guitar, Tabla....**


Best example for **open pipe** producing stationary waves (with antinodes at both ends) : **Flute**

Best example for **closed pipe** producing stationary waves (with a node at closed end) : **Clarinet**

Best example for **stretched string** producing stationary waves (with nodes at both ends) : **Guitar**

చెప్పుకోండి చూద్దాం: కాంతి తరంగానికి మరియు శబ్ద తరంగానికి ఉండే 'రెండు బీభత్సమైన తేడాలు' ఏమిటి?

i) కాంతి తరంగాలు water ripples వలే ఎత్తు పల్లాలతో సాగే Transverse Waves 

శబ్ద తరంగాలు పక్కపక్కన తోసుకుంటూ ముందుకు వెళ్ళే Longitudinal Waves 

ii) కాంతి తరంగాల వేగం, శబ్ద తరంగాల వేగం కంటే దాదాపు లక్షరెట్లు ఎక్కువ. (అవునా!?)

ప్రతి మనిషికి పంచేంద్రియాలు ఉన్నట్లు ప్రతి తరంగానికి ఉండే 'పంచాంగాలు' :

i) Wavelength(λ) ii) Frequency(ν) iii) Time period (T) iv) Speed (V) v) Phase(ϕ)

☞ **IPE View : WAVES** లో బాగా ప్రాక్టీస్ చేయాల్సిన Imp. LAQs:

Stationary wave harmonics in open pipe, closed pipe & stretched string