List of main Theories of nature and propagation of light

- Newton's corpuscular theory
- Huygen's wave theory
- Maxwell's electromagnetic theory
- Plack's quantum theory
- De- Broglie's dual nature theory

Source of corpuscles in newton's corpuscular theory

- Luminious body

List of Nature of properties of corpuscles in newton's corpuscular theory

- Extremely tiny
- Light
- Elastic

Speed of light in denser medium in newton's corpuscular theory compared to rarer medium

- Greater than in rarer medium

Speed of light in rarer medium in newton's corpuscular theory compared to denser medium

- Smaller than in denser medium

List of Observation of light explained by newton's corpuscular theory

- Rectilinear propagation of light
- Reflection of light
- Refraction of light
- Total internal reflection

List of Observation of light unexplained by newton's corpuscular theory

- Interference of light
- Polarization of light
- Diffraction of light

Medium of propagation of light in huygen's wave theory

- Ether

List of properties of Nature of ether in huygen's wave theory

- Ether is massless.
- Ether is colorless.
- Ether is elastic.
- Ether is invisible.
- Ether has no density.

Type of wave expressed as light wave in huygen's wave theory on the basis of direction of propagation particle with wave

- Longitudinal wave

List of Observation of light explained by huygen's wave theory

- Reflection of light
- Refraction of light
- Diffraction of light
- Interference of light

Observation of light unexplained by huygen's wave theory

- Polarization

Type of wave as light on the basis of medium of travel in maxwell's electromagnetic wave

- Electromagnetic wave

Type of wave as light on the basis of direction of vibration of particle with respect to the direction of propagation of wave in maxwell's electromagnetic wave

- Transverse wave

List of Contents present in or constituents making up electromagnetic wave

- Electric field
- Magnetic field

Observation of light explained by maxwell's electromagnetic nature of light wave propagation

- All observations of light

Source of radiation in planck's quantum theory

- Excited body

Form of radiation in planck's quantum theory

- Packets

Term for radiation in heat in planck's quantum theory

- Quanta

Term for radiation in light in planck's quantum theory

- Photon

Nature of quantity of radiation emitted by excited body in planck's quantum theory

- The packets of radiation are discrete.
- The packets of radiations are not continuous.

List of Observation of radiation of matter explained by planck's quantum theory

- Photoelectric effect
- Compton effect
- Raman effect

Compton effect in optics

- Compton effect is scattering of photon.

Condition for occurrence of compton effect in optics

- Compton effect occurs after interaction of photon with charged particle.

Raman effect in optics

- Raman effect is change in wavelength of light

Condition for occurrence of raman effect in optics

- Raman effect occurs after the travel of light in different chemical medium.

List of Observation of light unexplained by planck's quantum theory

- Interference of light
- Diffraction of light
- Polarization of light

Statement of debroglie dual nature theory in optics

- Light behaves both as particle.
- Light behaves as wave.

Contents for the formation of wave front

- Source of light
- Medium of propagation of wave front

List of Process of formation of wave front

- Disturbance
- Oscillation

Directions of travel of disturbance in wave front in optics

All directions

Source of disturbance in optics in wave front

Source of light

Consequence of disturbance in optics in wave front

Oscillation of particle

Type of motion of particles in propagation of wave

- Simple harmonic motion

Relation of phase of particles in propagation of wave

- Different

Nature of shape of wave front in isotropic and homogenous medium

- Regular

Condition of medium for regular wavefront

- Homogeneous medium
- Isotropic medium

Meaning of isotropy in optics

- Uniformity in parameter of a medium.
  - Uniformity in physical parameters of medium.
  - Uniformity in chemical parameters of medium.

Nature of shape of wave front in anisotropic and heterogenous medium

- Irregular
- Complicated

Condition of medium for irregular wavefront

- Anisotropic medium
- Heterogeneous medium

Condition for equality of phase in wavefront in optics

Equidistant from source

Relation of phase of particles equidistant from source

Same

Wave front in terms of geometrical interpretation in optics

- The wave front is a set of particles.

Elements in set of particles of a wavefront in optics

- Particles vibrating in same phase

List of Types of wave front

- Spherical wave front
- Cylindrical wave front
- Plane wave front

Basis for the division of types of wave front

- Shape of source of light
- Distance of source of light from the observer

Producers of Spherical wave front in optics

- Point source of light

Producers of cylindrical wave front in optics

Linear source of light

Producers of plane wave front in optics

- Distant source of light

Direction of ray with the wave front

- Perpendicular

Role of primary wavefront in huygen's principle

Act as new source of disturbance

Secondary wavelets in huygen's principle

Disturbance of primary wave front

Direction of propagation of secondary wavelet in huygen's principle

All direction

Velocity of propagation of secondary wavelet in huygen's principle

- Speed of light

Plane of consideration of new wavefront from secondary wavelets

- Construction of tangential plane to secondary wavelets.

Contents of wave produced by secondary wavelet at the instant of propgation

Content of wave produced by secondary wavelet taken in consideration at the instant of propagation

- Forward envelope of secondary wavelet

Expression for relation of amplitude with the angle of propagation in huygens wave theory of light

The expression for relation of amplitude with the angle of propagation is

- $$A\alpha(1+\cos\theta)$$

Magnitude of angle in backward wave front in huygens wave theory of light

- $$\theta = 180^\circ$$

Approximation of Magnitude of intensity in backward wave front in huygens wave theory of light

- Minimum

Magnitude of angle in forward wave front in hygen's wave theory of light

- $$\theta = 0^\circ$$

Approximation of Magnitude of intensity of forward wave front huygen's principle

- Minimum

List of Laws of reflection

- The magnitude of angle of incidence and the magnitude of angle of reflection is equal.
- The angle of incidence , the angle of reflection and the normal all lie at the same plane of incidence.

Expression for activities of primary wavelets on reflection of light in application of huygens theory

- The first wavelet incidents on point A .
- The other wavelets incident on point C'.
- The other wavelets incident on point B'.

Expression of activities of secondary wavelet at reflection in application of huygens theory

- The secondary wavelet of A reaches A'.
- The secondary wavelet of C' reaches C'' .
- The secondary wavelet of B is just reaching B'

Proof for congruency of triangles formed by the incident and the reflected plane in application of huygens theory of light

The triangle in consideration are

- Triangle formed by incident wave front
  - $$ABB^{'}$$
- Triangle formed by reflected wave front
  - $$AA^{'}B^{'}$$
- $$\angle ABB' = \angle AA'B$$ The magnitude of angle is $$90^{\circ}$$
- $$AB' = AB'$$ Plane of reflection as common side
- $$BB' = AA'$$Distance travelled by light in same time
- $$\triangle ABB' \cong AA'B$$

Derivation for expression of equality of angle of incidence of plane wavefront and the angle of reflection of plane wavefront at application of huygens principle to reflection of light

- $$\triangle ABB' \cong AA'B$$
- $$\angle BAB' = \angle A'B'A$$ Corresponding angle of congruent triangle
- $$i = r$$

Verification of conincidence of incident wavefront reflected wavefront and normal at application of hygen's principle of reflection of light

The quantities lying on the same plane of paper are

- Angle of reflection
- Angle of incidence
- Normal

The quantities are equiplanar.

List of laws of refraction

- The incident ray , the refracted ray and the normal lie on the same plane of incidence.
- The ratio of sine of incident ray to the sine of refracted ray is constant.
- The constant in the expression of refracted ray by snell's law is expressed as
-

$$\mu$$

List of parameters in consideration in application of huygens principle in refraction of light

- Plane
- Magnitude of angles
- Medium of travel
- Velocity of light in media

Working principle of verification of laws of refraction of light on the basis of huygen's wave theory of light

- Travel of light waves
- Disturbance
- Secondary wavelts

Relation for distance of travel of secondary wavelet in m1 media in application of huygen's wave theory of light in refraction of light

$$d_1 = v_1 t$$

Relation for distance of travel of secondary wavelet in m2 media in application of huygen's wave theory of light in refraction of light

- $$d_2 = v_2 t$$

Relationship of distance travelled by the secondary wavelets in terms of comparison in application of huygen's waave theory of light in refraction of light

$$d_2 < d_1$$

Reason for difference in travel of distance in different media in application of huygen wave theory of light in refraction of light

- The velocity of light in media are different.

Expression for refractive index at medium m2 with respect to m1 at huygens wave theory of light in application to refraction

$$\mu_{m_2} = \frac{v_1}{v_2}$$

Expression in sine of incidence in triangle in huygens wave theory of light in application to refraction

$$\sin i = \frac{v_1 t}{AC}$$

Expression of sine of refraction in triangle in huygens wave theory of light in application to refraction

$$\sin r = \frac{v_2 t}{AC}$$

Proof for refractive index in huygens wave theory of light in application to refraction

$$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$$

$$\frac{\sin_i}{\sin r} = \mu_{m_2}$$

Verification of point of incidence refraction and normal in to lie in same plane in huygens wave theory of light for refraction of light

The location of the following parameters are on the plane of paper.

- point of incidence
- point of refraction
- normal