DIFFRACTION

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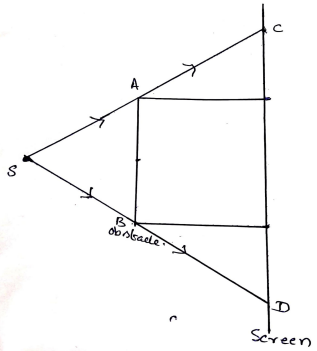
Diffraction

S is a monochromatic source of light. An Obstacle AB is placed in between S and the screen . According to rectilinear propagation of light, light travels in straight lines.So CD must be a shadow and it must be dark. But the geometrical shadow on the screen is never sharp. This is because light bends around the edges of the obstacle. This bending of light is very small when the wavelength of light waves is small in comparison with the dimensions of the obstacle and it is much pronounced when the dimensions of the obstacle are comparable to wavelength. This phenomenon is called **DIFFRACTION** .



The bending of light around the edges of an obstacle or the encroachment of light with in the geometrical shadow is called diffraction.

Types of Diffraction

Diffraction phenomenon can be divided into following two general classes

1) **Fraunhofer's Diffraction:**

   In this class of diffraction source and the screen or telescope(through which image is viewed) are placed at infinity or effectively at infinity(using lenses) from aperture. In this case the wavefront which is incident on the aperture or obstacle is plane.

2) **Fresnel's Diffraction:**

   In this class of diffraction, source and screen are placed at finite distances from the aperture of obstacle having sharp edges. In this case no lenses are used for making the rays parallel or convergent. The incident wave fronts are either **spherical** or **cylindrical.**

Difference between Fresnel and Fraunhofer diffractions

Fresnel's	Fraunhofer's
1. The source and screen are at finite distances from the aperture or obstacle. 2. No lenses are required to observe the diffraction pattern . 3. The incident wavefront is either spherical or cylindrical. 4. Diffraction patterns are studied in the direction of propagation of light.	1. The source and and screen are at infinte distance from the aperture. 2. The convex lenses are necessary to observe the diffraction. 3. The wavefront is plane. 4. Diffraction effects can be studied in any direction.

Difference between Interference and Diffraction

Interference	Diffraction
1. Interference is due to the superposition of two different wavefronts coming from coherent sources 2. Interference fringes are of the same width. 3. All bright fringes are of the same intensity. 4. All point of minimum intensity are perfectly dark. 5. The spacing between fringes is uniform. 6. There is a good contrast between maxima and minima	1. Diffraction is due to the superposition of secondary wavelets from the different parts of same wavefront 2. Diffraction fringes are not of the same width 3. All bright fringes are not of the same intensity 4. All point of minimum intensity is not perfectly dark. 5. The spacing between fringes is not uniform. 6. There is a poor contrast between maxima and minima