

**DEPARTMENT OF PHYSICS AND NANOTECHNOLOGY**  
**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**18PYB101J - Electromagnetic Theory, Quantum Mechanics, Waves and Optics**  
**Module-IV ( Waves and Optics) Lecture-2**

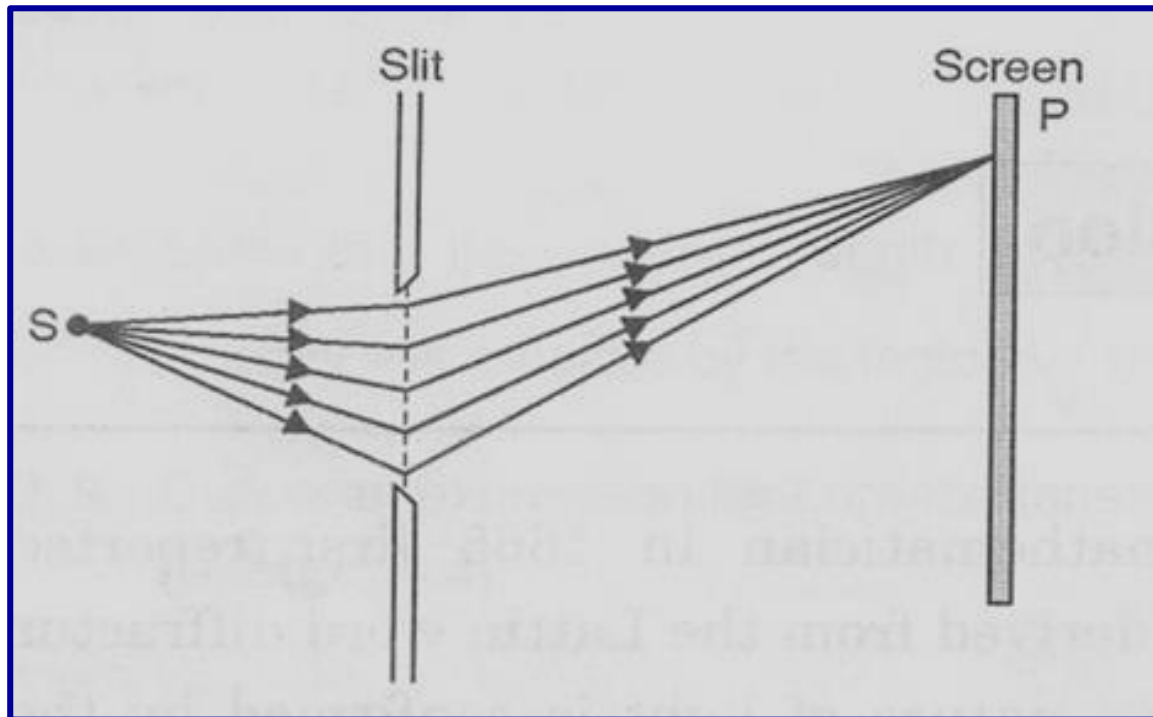
***Types of Diffraction***

# Types of Diffraction



The diffraction phenomenon are usually divided into two classes

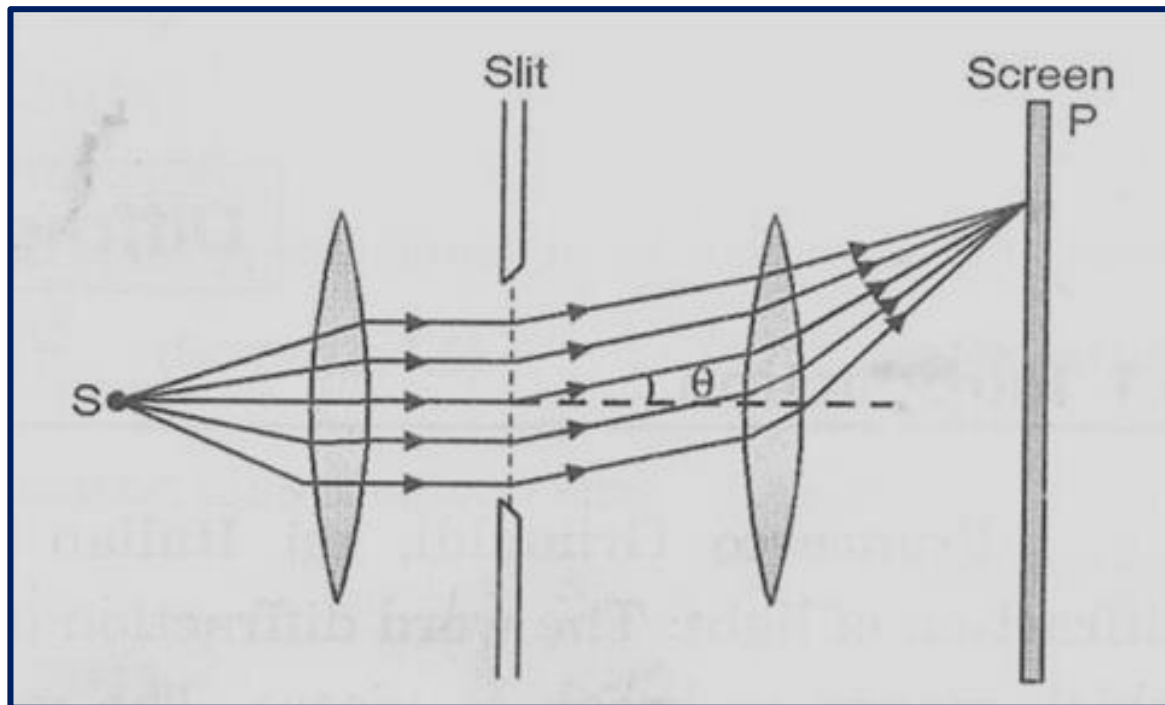
i) **Fresnel** class of diffraction phenomenon where the source of light and screen are in general at a finite distance from the diffracting aperture



# Types of Diffraction



ii) **Fruanhofer** class of diffraction phenomenon where the source and the screen are at infinite distance from the aperture. This class of diffraction is simple to treat and easy to observe in practice.



## **Difference between Fresnel and Fraunhofer's Diffraction**

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### **Fresnel Diffraction:**

1. Point source of light or an illuminated narrow slit is used as light source
2. Light incident on the aperture or obstacle is a spherical or cylindrical wave front
3. The source and screen are at finite distance from the aperture or obstacle producing diffraction
4. Lenses are not used to focus the rays

### **Fraunhofer diffraction:**

1. Extended source of light at infinite distance is used as light source
2. Light incident on the aperture or obstacle is a plane wave front
3. The source and screen are at infinite distance from the aperture or obstacle producing diffraction
4. Converging lens is used to focus the rays

## Difference between Interference and Diffraction

BASIS OF COMPARISON	INTERFERENCE	DIFFRACTION
<b>Description</b>	Interference is a phenomenon whereby two waves superimpose forming a resultant wave of different amplitude.	Diffraction of light is a phenomenon of bending of light around the corners of an obstacle or apertures and its consequent spreading into regions of its geometrical shadow.
<b>Waves</b>	The waves emitted by two coherent sources travel in straight line.	The waves emitted by two coherent sources travel in straight line.
<b>Intensity Of Bright Fringes</b>	All bright fringes are of the same intensity.	The intensity of bright fringes decreases as we move further from the central bright fringe on either side.
<b>Points of Minimum Intensity</b>	The points of minimum intensity show complete darkness.	The minimum intensity points are not completely dark.

## Difference between Interference and Diffraction

BASIS OF COMPARISON	INTERFERENCE	DIFFRACTION
<b>Width Of The Central Maximum</b>	Width of the central maximum is same as that of the other bright fringes i.e fringe width is same for all fringes including central maxima.	Width of central maximum is broader than other maxima and it's double the fringe width.
<b>Spacing Between Fringes</b>	The spacing between different fringes displays uniformity in nature.	The spacing between different fringes is non-uniform.
<b>Minimum Intensity</b>	Minimum intensity may be zero.	Minimum intensity is not zero.
<b>Slit Or Obstacle</b>	A slit or obstacle is not necessary for wave interference to take place.	For diffraction to take place, slit or obstacle is necessarily required.
<b>Double Slit</b>	Interference through double slit forms interference fringes on the screen (Alternate and light bands or fringes).	Diffraction through double slit produces interference. Therefore, alternate bright and dark fringes are formed.