B.Sc. Part-II Physics (Hons)

Fresnel and Fraunhofer Diffraction :—

Diffraction Phenomena can conveniently by divided into two groups:—

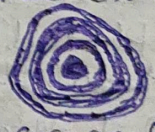
(i) Fresnel diffraction Phenomena.

(ii) Fraunhofer diffraction Phenomena.

In the Fresnel class of diffraction, the source or the screen or both are at finite distances from the aperture or obstacle causing diffraction. In this case, the effect at a specific point on the screen due to the exposed incident wavefront is considered and no modification is made by lenses and mirrors. In such a case, the phenomenon observed on the Screen is called Fresnel diffraction pattern.

In the Fraunhofer class of diffraction Phenomena the source and the screen on which the pattern is observed are at infinite distances from the aperture or the obstacle causing diffraction. Fraunhofer diffraction pattern can be easily observed in practice The incoming light is rendered parallel with a lens and the diffracted beam is focussed on the screen with another lens. observation of Fresnel diffraction Phenomena do not require any lenses.

Theortical treatment of Fraunhofer diffraction Phenomena is simpler. Fresnel class of diffraction Phenomena are treated ~~first~~ and observed on the Screen.

Zone plate:— (a)  (b) 

A Zone plate is a specially constructed screen such that light is obstructed from every alternate Zone. It can be designed so as to cut off light due to the even numbered Zone or that due to the odd numbered Zone. The correctness of Fresnel's method in dividing a wave front into half period zones can be verified with its help.

The shown in fig (a) The odd numbered zones are covered with black and a reduced photograph is taken and developed negative the odd zones are transparent to incident and shown in fig (b) In the developed even zones will cut off light.