

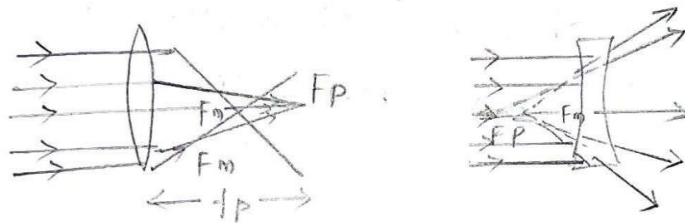
OPTICS

UNIT-1 Geometrical Optics.

2 Marks.

1 Spherical Aberration:

The failure of a lens to form a point image of a point object on the axis is called Spherical Aberration.



2 Methods of reducing spherical Aberration.

1. COMA
2. Aplanatic surface
3. Astigmatism
4. Curvature of the field

3 A Planatic lens:

A planatic Points are two Conjugate Points on the axis with respect to a spherical surface such that an object placed at one of these points produces at the second point an image which is free from spherical Aberration and coma.

4 Aberrations in lenses

The deviations in the size, shape, position and colour in the actual images produced by the lens in comparison to the object called Aberration produced by lens.

5 Chromatic Aberrations :

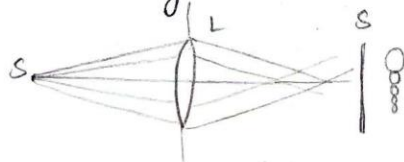
Chromatic Aberrations are distortions of the image due to the dispersion of light in the lenses of an optical system when a white light is used. The defect of coloured image formed by a lens with white light is called Chromatic Aberration.

6 Achromatic Aberration in lenses

When two or more lenses are combined together in such a way that the combination is free from Chromatic Aberration, then such a combination is called achromatic combination of lenses.

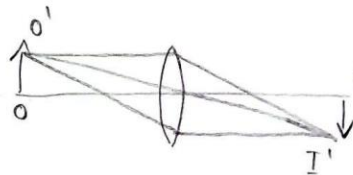
7 COMA :

When a lens is corrected for spherical aberration, it forms a point image of a point object situated on the axis. But if the point object is situated off the principal axis, the lens even corrected for spherical Aberration, forms a Comet-like image in place of point image. This defect in the image is called coma.



8 Curvature of the field

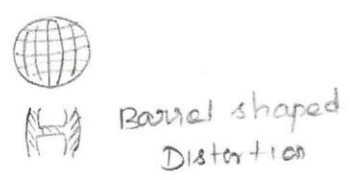
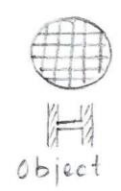
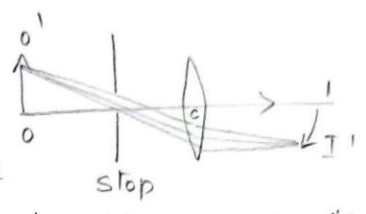
Even if a lens is free from spherical aberration



Coma and astigmatism, the image of an extended plane object oo' is curved. If a screen is placed at I perpendicular to the axis the complete ii' will not be in focus. This defect is called curvature.

9 Distortion:

When a stop is used with a lens to reduce the various aberrations, the image of a plane square-like object placed perpendicular to the axis is not of the same shape as the object. This defect is called Distortion.



10 Types of Distortion

1. Pin Cushion Distortion
2. Barrel shaped Distortion.