CONCEPT MAP

Optical Instruments

Optical Instruments

Human Eye: It is the finest photographic camera.

Accommodation : It is the adjusting power of human eye so that it can observe distinctly the objects situated at widely different distances.

Defects of Vision

Myopia : Eye can see object lying near, but can't see far off objects. It can be corrected by using concave lens.

Hypermetropia : Eye can see far off objects clearly but can't see nearby objects. It can be corrected by convex lens.

Microscope

Simple Microscope: It is used for observing magnified images of tiny objects. It consists of a converging lens of small focal length. Object is held between principle focus and optical centre of the lens. The image formed is virtual, erect and magnified.

Compound Microscope: The images are highly magnified. The objective lens forms a real, inverted and magnified image of the object. This acts as an object for eye lens, which forms a virtual, erect and magnified image seen by the eye held close to the eye lens.

Magnifying Power:

$$M = \frac{\tan\beta}{\tan\alpha} = \frac{\beta}{\alpha}$$

Image at Far Point:

$$M = \frac{D}{f}$$

Image at Near Point:

$$M = 1 + \frac{D}{f}$$

Image at Near Point:

$$M = \frac{v_0}{u_0}\left(1 + \frac{D}{f_e}\right)$$

Image at Infinity:

$$M = \frac{v_0}{u_0}\left(\frac{D}{f_e}\right)$$

Astronomical Telescope

Magnifying power when image is at infinity.

$$M = \frac{f_o}{f_e}$$

Magnifying Power when image is at near point.

$$M = \frac{f_o}{f_e}\left(1 + \frac{f_e}{D}\right)$$

Symbols Used

α = angle subtended by image at the eye.
β = angle subtended by the object at the eye.
D = least distance of distinct vision.
u_0 = distance of object from objective lens.
v_0 = distance of image from objective lens.
f_0 = focal length of objective lens.
f_e = focal length of eye lens.