

Paper-7Telescope

Unit-(3)

paper-(7)

Telescope is an optical instrument which help us to see the object present at large distance. It forms enlarged images of distant objects, which are not distinctly visible to the unaided eye, and brings them nearer to the eye. As Example  $\rightarrow$  A binocular which is essentially a telescope, collect light over a large surface and concentrates it at a point producing a brighter image.

A telescope are classified into two categories:-

- ① Refracting telescope
- ② Reflecting telescope.

A Refracting telescope uses a pair of lenses and a reflecting telescope uses a combination of a lens and a mirror. Refracting telescope are also two types:-

- ① Astronomical telescope.
- ② Terrestrial telescope.

① Refracting astronomical telescope.

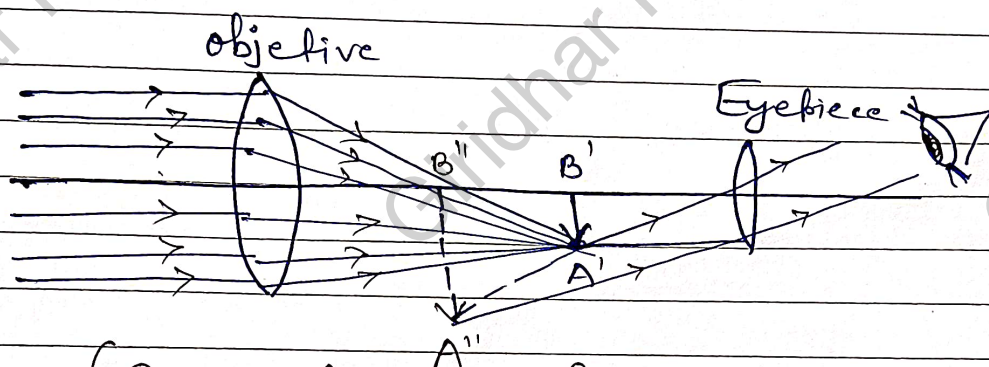
The main components of a telescope are:-

- (i) A metal tube which holds the objective - a convex lens of large focal length at one end and an eyepiece attached to a draw tube

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Which can be moved inside it at the other end;

- (ii) a steel beam to mount the telescope tube.
- (iii) knob to control the distance between the objective and the eyepiece,
- (iv) rack and pinion arrangement to control the movement of the eyepiece.



(Ray diagram for image formation.)

The image  $A'B'$  lies in the focal plane of the eyepiece as well, the image  $A''B''$  will be formed at infinity and it appears that the distant object is directly visible in a magnified form. The separation between the objective and the eyepiece is then equal to the sum of their focal lengths. In this case the telescope is said to be in normal adjustment.

The magnifying power of a telescope adjusted for infinity is defined as the ratio of the focal length of the objective to the focal length of the eyepiece

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