(52) Microscope → optical instrument which magnifies a small object

Δ → Min^m distance of distinct vision [Min^m distance upto which eye can see distinctly]

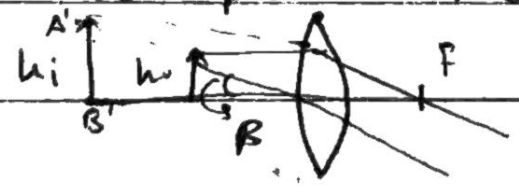
⇒ 25cm (near pt) ∞ (far pt)

Visual ∠ → ∠ formed by obj at eye

height of obj ∝ visual ∠

M = Visual ∠ formed by final image / Visual ∠ " " obj kept at Δ

(53) Simple Microscope → Convex lens (obj bw F & O)



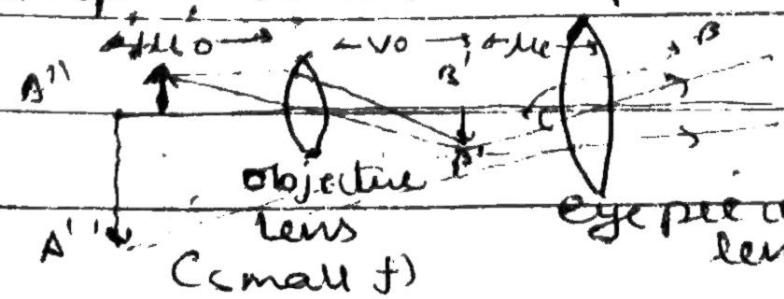
$M = \frac{\Delta}{f_e}$

(1) Max^m M (Strained eye) ⇒ final image at Δ = $1 + \Delta/f$

(2) Normal adjustment (Relaxed eye) ⇒ " " " ∞ = Δ/f

$\frac{\Delta}{f} \leq M \leq 1 + \frac{\Delta}{f}$

(54) Compound Microscope →



⇒ Simple Microscope

Refracting telescope → Need large aperture lens to collect more light

Large lens → costly, produce chromatic abberations

$M = M_o \times M_e$

(1) Max M → final v at D → $\frac{1}{u_e} = \frac{1}{f_o} + \frac{1}{D}$

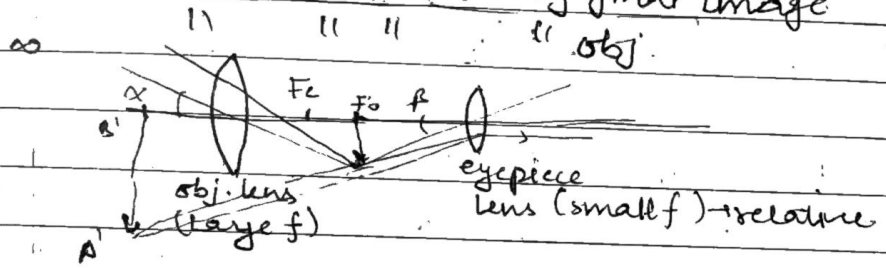
Normal adjustment = $u_e = f_e$

Length of Microscope (Dist b/w 2 Lens) = $|v_o + u_e|$

(5) Telescope → See distant object clearly
→ Bring obj close to eye [not inc size]

(i) Astronomical Telescope [Refracting telescope]

M = Visual ∠ formed by final image



$M = f_o / u_e$

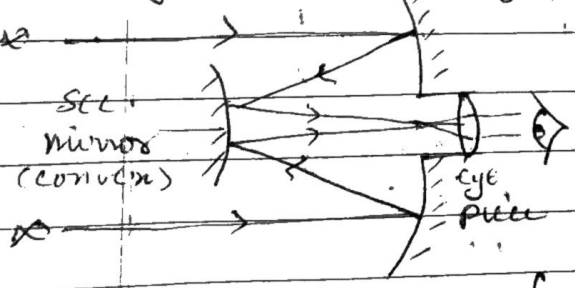
(a) Max M (Strained eye) → $f_o/f_e \cdot \left(1 + \frac{f_e}{D}\right)$ $\left[\frac{1}{u_e} = \frac{1}{f_o} + \frac{1}{D}\right]$

(b) Normal Adjustment (Relaxed eye) → f_o/f_e $[u_e = f_e]$

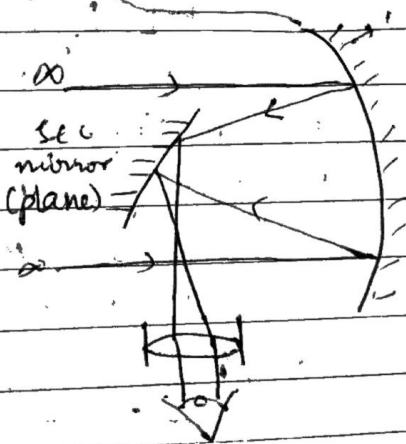
Length of telescope = $|f_o| + |u_e|$
$= |f_o| + |f_e|$

(b) Reflecting Telescope

(a) Cassegrain → Parabolodial mirror (obj) → no spherical abberation



(b) Newtonian



$M_D = \frac{f_o}{f_e}\left(1 + \frac{f_e}{D}\right)$ $M_\infty = \frac{f_o}{f_e}$

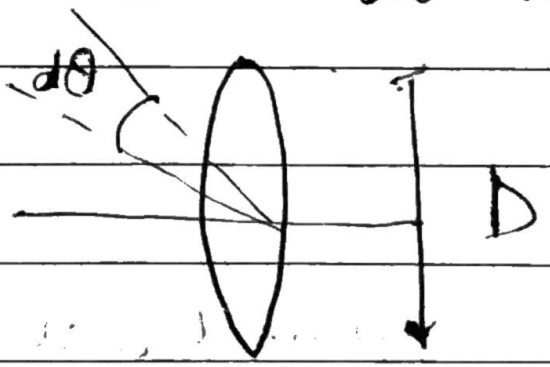
(8) Resolving power $\propto \frac{1}{\lambda}$

R.P of microscope $= \frac{1}{d} = \frac{2\mu \sin\theta}{\lambda}$

μ = medium between the object & objective lens of microscope

R.P of Telescope $= d\theta \propto \lambda/D \Rightarrow \frac{1}{d\theta} = \frac{D}{1.22\lambda}$

$d\theta = \frac{1.22\lambda}{D}$



→ Used in eye related problems.