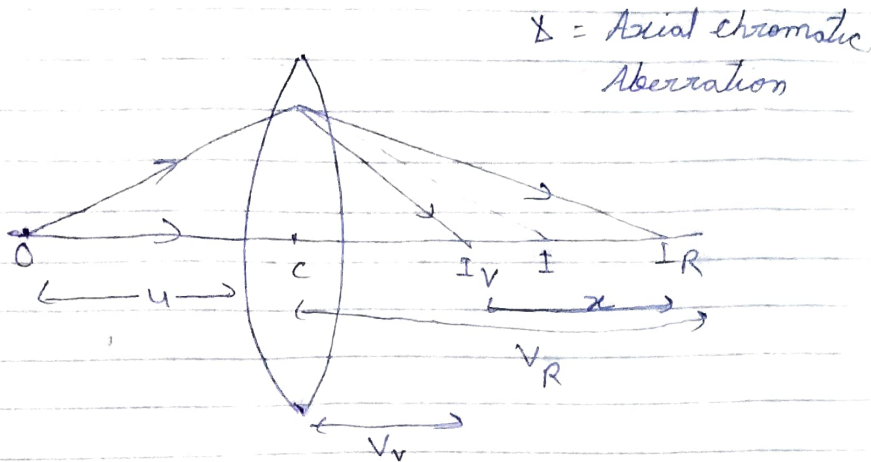


## 12. SC Part - II

Expression for longitudinal chromatic aberration for an object at finite distance



$$\Delta = v_R - v_V$$

By using lens formula

$$\frac{1}{f} = -\frac{1}{u} + \frac{1}{v}$$

For Red image

$$\frac{1}{f_R} = -\frac{1}{u} + \frac{1}{v_R} \quad \text{--- (i)}$$

For violet image

$$\frac{1}{f_V} = -\frac{1}{u} + \frac{1}{v_V} \quad \text{--- (ii)}$$

$$\frac{1}{f_V} - \frac{1}{f_R} = -\frac{1}{u} + \frac{1}{v_V} - \left(-\frac{1}{u} + \frac{1}{v_R}\right)$$

$$\frac{1}{f_V} - \frac{1}{f_R} = \frac{1}{v_V} - \frac{1}{v_R}$$

$$\frac{f_R - f_V}{f_V \cdot f_R} = \frac{v_R - v_V}{v_V \cdot v_R}$$

$$[f_R - f_V = \omega f] \quad (f_V f_R = f^2)$$

$$[v_V v_R = v^2]$$

$$\frac{\omega f}{f^2} = \frac{v_R - v_V}{v^2}$$

$$\therefore v_R - v_V = \frac{\omega v^2}{f}$$

— + —