

GOVIND VIDYALAYA TAMULIA

TOPIC: RAY OPTICS
TOTAL = 20 MARKS

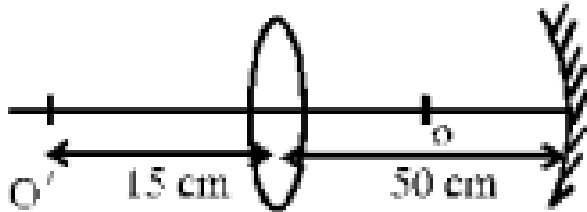
DATE : 1-11-2014

DURATION = 45 MIN.

UNIT TEST –XII (SET- A)

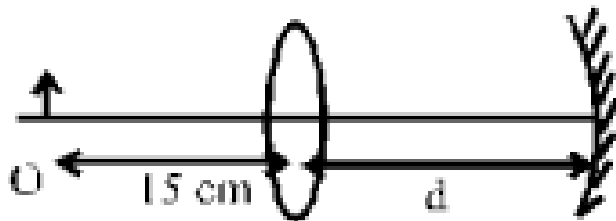
1 .i) Using the relation for refraction at a single spherical refracting surface, derive the lens maker's formula.

(ii) In the accompanying diagram, the direct image formed by the lens ($f = 10\text{cm}$) of an object placed at O and that formed after reflection from the spherical mirror are formed at the same point. What is the radius of curvature of the mirror? (5 Mrks)



2) (i) Derive the mirror formula which gives the relation between f , v and u . What is the corresponding formula for a thin lens?

(ii) Calculate the distance d , so that a real image of an object at O , 15cm in front of a convex lens of focal length 10cm be formed at the same point O . The radius of curvature of the mirror is 20cm . Will the image be inverted or erect? (5 Mrks)



3) Which two main considerations are kept in mind while designing the 'objective' of an astronomical telescope? Obtain an expression for the angular magnifying power and the length of the tube of an astronomical telescope in its 'normal adjustment' position. (3 Mrks)

4) With the help of a labelled ray diagram, show the image formation by a compound microscope. Derive an expression for its magnifying power. (3 Mrks)

5) Write the relation between the angle of incidence (i), the angle of emergence (e), the angle of prism (A) and the angle of deviation (δ) for rays undergoing refraction through a prism. What is the relation between *angle i and angle e* . and for rays undergoing minimum deviation? Using this relation, write the expression for the refractive index (μ) of the material of a prism in terms of and the angle of minimum deviation (δ_m). (2 Mrks)

6) A right angled isosceles glass prism is made from glass of refractive index 1.5. Show that a ray of light incident normally on

(i) One of the equal sides of this prism is deviated through 90°

(ii) The hypotenuse of this prism is deviated through 180° (2 Mrks)