

QUESTION BANK

Ray Optics Test 1

- Show the variation of  $u$  and  $v$  in case of a convex mirror? [1]
- Two lenses having focal length  $f_1$  and  $f_2$  are placed coaxially at a distance  $x$  from each other. [1] What is the focal length of the combination?
- Following data was recorded for values of object distance and corresponding values of image distance in the experiment on study of real image formation by a convex lens of power +5 D. one of three observation is incorrect. Identify and give reason? [2]

S. No.(u)	1	2	3	4	5	6
Object distance(u)	25	30	35	45	50	55
Image distance	97	61	37	35	32	30

- A bird flying high in the air appears to be higher than in reality. Explain why? [2]
- An equi-convex lens of radius of curvature  $R$  is cut into two equal parts by a vertical plane, [3] so it becomes a plano-convex lens. If  $f$  is the focal length of equi-convex lens, then what will be focal length of the plano-convex lens?
- A converging lens of focal length 6.25cm is used as a magnifying glass if near point of the observer is 25cm from the eye and the lens is held close to the eye. Calculate (1) Distance of object from the lens. (2) Angular magnification and (3) Angular magnification when final image is formed at infinity. [3]
- Draw a graph to show that variation of angle of deviation  $D_m$  with that of angle of incidence  $i$  for a monochromatic ray of light passing through a glass prism of refracting angle  $A$ . hence deduce the relation? [3]

$$\mu = \frac{\sin \frac{A + \delta}{2}}{\sin \frac{A}{2}}$$

- Four double convex lens with following specification are available.

Lens	Focal length	Aperture	Lens	Focal length	Aperture
------	--------------	----------	------	--------------	----------

A	100cm	10cm	C	10cm	2cm
B	100cm	5cm	D	5cm	2cm

- (a) Which of the given four lenses should be selected as objective and eyepiece to construct an astronomical telescope and why? What will be the magnifying power [3] and length of the tube of this telescope?
- (b) An object is seen with the help of a simple microscope, firstly in red light and then is [3] blue light. Will the magnification be same in both the cases? Why?

### Ray Optics Test 2

- The refractive index of a material of a convex lens is  $n_1$  it is immersed in a medium [1] of refractive index  $n_2$ . A parallel beam of light is incident on the lens. Trace the path of the emergent rays when  $n_2 > n_1$ .
- In a telescope the focal length of the objective and the eye piece are 60cm and 5cm [1] respectively. What is? (1) Its magnification power (2) Tube length
- Although the surfaces of a goggle lens are curved it does not have any power. [2] Why?
- A ray of light is incident normally on one face of the prism of apex angle  $30^\circ$  and [2] refractive index  $\sqrt{2}$ . Find the angle of deviation for the ray of light?
- A reflecting type telescope has a concave reflector of radius of curvature 120cm. [3] calculate the focal length of eye piece to secure a magnification of 20?
- Show that a convex lens produces an  $N$  time magnified image, when the object [3]
 
$$u = f \left( 1 \pm \frac{1}{N} \right)$$
 distances from the lens have magnitude  $|f \pm \frac{f}{N}|$ . Here  $f$  is the magnitude of the focal length of the lens. Hence find two values of object distance. For which a convex lens of power 2.5 D will produce an image that is four times as large as the object?
- Define total internal reflection of light? Hence write two advantages of total reflecting [3] prisms over a plane mirror?
- (a) A person looking at a mesh of crossed wires is able to see the vertical lines more [2]

distinctly than the horizontal wires. What is the effect due to? How is such a defect of vision corrected?

[3]

(b) A man with normal near point (25cm) reads a book with small print using a magnifying glass: a thin convex lens of focal length 5cm.

- (i) What is the closest and the farthest distance at which he can read the book when viewing through the magnifying glass ?
- (ii) What is the maximum and minimum angular magnification (magnifying power) possible using the above simple microscope?