FIITJEE INTERNAL TEST

C.B.S.E. TEST – IV

PHYSICS

Class – XII

Maximum Marks: 30 **Time Allowed: 1 hour**

General Instructions:

(i) There are 11 questions in all. All Questions are compulsory.

(ii) This question paper has four sections: Section A, Section B, Section C and Section D.

(iii) Section A contains four questions of two marks each, Section B contains two questions of three marks each, Section C contains two question of five mark each. In Section D contains one case study (paragraph) having 3 questions objective single correct option two marks each question.

(iv) You may use log tables if necessary but use of calculator is not allowed.

SECTION-A

1. Draw a ray diagram of an astronomical telescope in the normal adjustment position. Write down the expression for its magnifying power.

2. (i) Out of blue and red light which is deviated more by a prism? Give reason.
   (ii) Give the formula that can be used to determine refractive index of materials of a prism in minimum deviation condition.

3. Define critical angle with reference to total internal reflection. Calculate the critical angle for glass - air surface, if a ray of light which is incident in air on the glass surface is deviated through 15^0, when angle of incidence is 45^0.

4. Find the radius of curvature of the convex surface of a plano-convex lens, whose focal length is 0.3 m and the refractive index of the material of the lens is 1.5.

SECTION-B

5. A double convex lens made of glass of refractive index 1.5 has its both surfaces of equal radii of curvature of 20 cm each. An object of 5 cm height is placed at a distance of 10 cm from the lens. Find the position, nature and size of the image.

6. Use the mirror equation to show that
   (a) an object placed between f and 2f of a concave mirror produces a real image beyond 2f.
   (b) a convex mirror always produces a virtual image independent of the location of the object.
   (c) an object placed between the pole and focus of a concave mirror produces a virtual and enlarged image.

SECTION-C

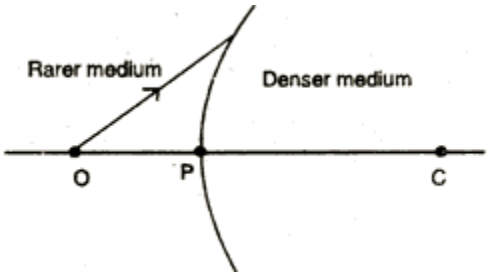
7. Define magnifying power of a telescope. Write its expression. A small telescope has an objective lens of focal length 150 cm and an eye piece of focal length 5 cm. If this telescope is used to view a 100 m high tower 3 km away, find the height of the final image when it is formed 25 cm always from the eye piece.

OR

How is the working of a telescope different fro that of a microscope?

The focal lengths of the objective and eyepiece of a microscope are 1.25 cm and 5 cm respectively. Find the position of the object relative to the objective in order to obtain an angular magnification of 30 in normal adjustment.

8. A spherical surface of radius of curvature R, separates a rarer and a denser medium as shown In the figure.



Complete the path of the incident ray of light, showing the formation of a real image. Hence derive the relation connecting object distance ‘u’, image distance ‘v’, radius of curvature R and the refractive indices a and ; of the two media Briefly explain, how the focal length of a convex lens changes, with increase in wavelength of incident light.

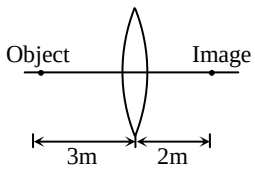
OR

(a) With the help of a suitable ray diagram, derive the lens formula.

(b) A convex lens of focal length 10 cm is placed coaxially 5 cm away from a concave lens of focal length 10 cm. If an object is placed 30 cm in front of the convex lens, find the position of the final image formed by the combined system.

SECTION-D
Paragraph Based Questions

An object is placed at a distance 3 meter from an equi-convex lens of refractive index 1.5. Its image is formed at 2 m from the lens as shown in the figure.



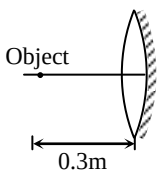


Fig.(a)

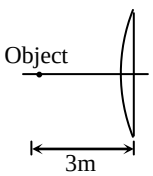


Fig.(b)

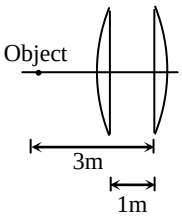


Fig.(c)

9. Find the position of image if one face of the lens is silvered [Fig.(a)]

(A) 12 m from the lens towards right (B) 12 m from the lens towards left

(C) 6 m from the lens towards right (D) at infinity

10. Find the position of image if lens is cut into two symmetrical plano convex lens and one of the plano convex lens is removed [Fig.(b)].
(A) 12 m from the lens towards right (B) 12 m from the lens towards left
(C) 6 m from the lens towards right (D) 6 m from the lens towards left

11. Find the position of image if plano convex surfaces are displaced by 100 cm. [Fig.(c)]
(A) 2.94 m towards right of second lens (B) 2.94 m towards right of first lens
(C) 3.31 m towards right of second lens (D) 4.31 m towards right of first lens