



# SHIKSHA CLASSES

Subject : Physics

Question Paper

Total Marks :25

Class : XI

9 : Optics

Time : 1 Hour

## SECTION - A

**Q.1 : Choose the correct option :** 4

- i) Select the WRONG statement.
- a) Smaller angle of prism is recommended for greater angular dispersion.
- b) Right angled isosceles glass prism is commonly used for total internal reflection.
- c) Angle of deviation is practically constant for thin prisms.
- d) For emergent ray to be possible from the second refracting surface, certain minimum angle of incidence is necessary from the first surface.
- ii) A spherical marble of refractive index 1.5 and curvature 1.5 cm, contains a tiny air bubble at its centre. Where will it appear when seen from outside?
- a) 1 cm inside      b) at the centre
- c)  $\frac{5}{3}$  cm inside      d) 2 cm inside
- iii) Angles of deviation for extreme colours are given for different prisms. Select the one having maximum dispersive power of its material.
- a)  $7^\circ, 10^\circ$       b)  $8^\circ, 11^\circ$
- c)  $12^\circ, 16^\circ$       d)  $10^\circ, 14^\circ$
- iv) Which of the following aberrations will NOT occur for spherical mirrors?
- a) Chromatic aberration

b) Coma      c) Distortion

d) Spherical aberration

**Q.2 : Answer the following :** 2

- i) State laws of reflection
- ii) Define total internal reflection.

## SECTION B

**: Answer the following : (ANY 3)** 6

**Q.3** : What are converging and diverging beams?

**Q.4** : Show that parabolic mirrors can eliminate spherical aberrations completely.

**Q.5** : Calculate the critical angle between glass and air ( $\mu_g = \frac{3}{2}$ ).

**Q.6** : State an expression for dispersive power of a prism.

**Q.7** : State the methods used to reduced chromatic aberration.

## Section C

**: Answer the following : (ANY 3)** 9

**Q.8** : i) Define magnifying power of an optical instrument.

ii) Give the expression for magnifying power of telescope when image is formed at DDV.

**Q.9** : Draw a neat labelled diagram explaining chromatic aberrations in a convex lens.

**Q.10** : Prove the relation,  $i + e = A + \delta$ , for a prism.

**Q.11** : The critical angle for a ray is  $38^\circ 42'$  for glass and  $42^\circ$  for glycerine. What is the R.I. for glycerine with respect to glass?

**Q.12 :** Drive the formula for refractive index in terms of apparent depth.

**SECTION D**

**: Answer the following : (ANY 1) 4**

**Q.13 :** Derive the relation  $\frac{(n_2 - n_1)}{R} = \frac{n_2}{V} - \frac{n_1}{u}$

for any curved surface separating two transparent medium.

**Q.14 :** A line beam of white light is incident upon the longer of a plane parallel glass slab of breadth 5 cm at angle of incidence  $60^\circ$ . Calculate lateral deviation of red and violet rays and lateral dispersion between them as they emerge from the opposite side. Refractive indices of the glass for red and violet 1.51 and 1.53 respectively.

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