

Model Question Paper 1

Ray Optics 1

11th Standard

Physics

Reg.No. :

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Answer all the Questions

Time : 00:45:00 Hrs

Total Marks : 40

5 x 1 = 5

Part A

- 1) The number of images of an object held between two parallel mirrors.
(a) infinity (b) 1 (c) 3 (d) 0
- 2) Radius of curvature of concave mirror is 40 cm and the size of image is twice as that of object, then the object distance is
(a) 20 cm (b) 10 cm (c) 30 cm (d) 60 cm
- 3) A ray of light passes from a denser medium strikes a rarer medium at an angle of incidence i . The reflected and refracted rays are perpendicular to each other. The angle of reflection and refraction are r and r' . The critical angle is.....
(a) $\tan^{-1}(\sin i)$ (b) $\sin^{-1}(\tan i)$ (c) $\tan^{-1}(\sin r)$ (d) $\sin^{-1}(\tan r')$
- 4) Light passes through a closed tube which contains a gas. If the gas inside the tube is gradually pumped out, the speed of light inside the tube
(a) increases (b) decreases (c) remains constant (d) first increases and then decreases
- 5) In Michelson's experiment, when the number of faces of rotating mirror increases, the velocity of light.....
(a) decreases (b) increases (c) does not change (d) varies according to the rotation

Part B

5 x 2 = 10

- 6) State the laws of reflection.
- 7) Show that the reflected ray turns by 2θ when mirror turns by θ .
- 8) Explain the image formation in plane mirrors.
- 9) What is the difference between the virtual images produced by
(i) plane mirror, (ii) concave mirror, (iii) convex mirror?
- 10) The surface of the sunglasses are curved, yet their power may be zero. Why?

Part C

5 x 3 = 15

- 11) Light of wavelength $5000 \text{ \AA}$ falls on a plane reflecting surface. Calculate the wavelength and frequency of reflected light. For what angle of incidence, the reflected ray is normal to the incident ray?
Given data.
Wavelength of light (λ_i) = $5000 \text{ \AA} = 5000 \times 10^{-10} \text{ m}$
- 12) At what distance from a convex mirror of focal length 2.5 m should a boy stand, so that his image has a height equal to half the original height?
Given data.
Focal length of the given convex mirror = 2.5 m
The boy must stand at what distance so that his image has a height equal to half the original height.
 $\Rightarrow h_2 = \frac{1}{2} h_1$
- 13) Establish the relation $\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2}$ of thin lenses in contact.
- 14) Derive the relation $\mu = \frac{\sin \frac{A+B}{2}}{\sin \frac{A}{2}}$.
- 15) Does a beam of white light disperse through a hollow prism?

Part D

2 x 5 = 10

- 16) In a Michelson's experiment the distance travelled by the light between two reflections from the octagon rotating mirror is 4.8 km. Calculate the minimum speed of the mirror so that the image is formed at the non-rotating position.
Given data.
The distance travelled by the light between two reflections from the octagonal rotating mirror (D) = $4.8 \text{ km} = 4.8 \times 10^3 \text{ m}$
Velocity of light (C) = $3 \times 10^8 \text{ ms}^{-1}$
- 17) If the refractive index of diamond be 2.5 and glass 1.5, then how faster does light travel in glass than in diamond?
Given data.
Refractive index of diamond = 2.5
Refractive index of glass = 1.5
