33/35

Periodic Test - I (2025-26)
Subject: Physics (041)
Date: 12 /06/25
Time: 2 Hours

Maximum Marks: 35

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Class: 12
Roll No: _____
Invigilator's Sig _____

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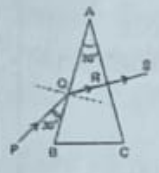
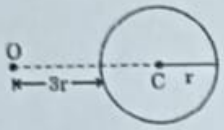
General Instructions:

This question paper contains 16 questions. All questions are compulsory.
Question nos. 1 to 8 are very short answer type questions carrying 1 mark each.
Question nos. 9 to 10 are short answer type–I questions carrying 2 marks each.
Question nos. 11 to 13 are short answer type–II questions carrying 3 marks each.
Question nos. 14 is case based study question carrying 4 marks each.
Question nos. 15 to 16 are long answer type–I questions carrying 5 marks each.
There is no overall choice. However, an internal choice has been provided in questions of three mark, questions of three marks, and questions of five marks.

PART A

	Section A	
1	In a compound microscope, the intermediate image is: a) Virtual, inverted and magnified b) Real, erect and magnified c) Virtual, erect and magnified d) Real, inverted and magnified	[1]
2	In the diagram, a prism of angle 30° is used. A ray PQ is incident as shown. An emergent ray RS emerges perpendicular to the second face. The angle of deviation is:  a) 60^o b) 0^o c) 30^o d) 45^o	[1]
3	Which of the following principle is used in optical fiber? a) Total internal reflection b) Scattering c) Interference d) Diffraction	[1]
4	What happens, if the monochromatic light used in Young's double slit experiment is replaced by white light?	[1]

	a) Only the central fringe is white and all the other fringes are colored b) All bright fringes have colors between violet and red c) All bright fringes become white d) No fringes are observed	
5	The main condition for diffraction to be observed is a) size of obstacle should be much larger than the wavelength of the wave b) size of obstacle should be comparable to the wavelength of the wave c) for any size of obstacle d) size of obstacle should be much smaller than the wavelength of the wave	[1]
6	Ratio of intensities of two waves are given by 4 : 1. The ratio of the amplitude of the two waves is a) 1: 4 b) 4: 1 c) 1: 2 d) 2: 1	[1]
7	**Assertion:** A convex mirror of focal length lin air is placed in liquid of refractive index 1.36, its focal length becomes 1.36 times that in air. **Reason:** Focal length of a mirror is directly proportional to the refractive index of the surrounding medium. a) Assertion and reason both are correct statements and reason is correct explanation for assertion. b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. c) Assertion is correct statement but reason is wrong statement. d) Assertion is wrong statement but reason is correct statement.	[1]
8	**Assertion (A):** Interference obeys the law of conservation of energy. **Reason (R):** The energy is redistributed in case of interference. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	[1]
	Section B	
9	A ray of light incident on one of the faces of a glass prism of angle **A** has angle of incidence 2A. The refracted ray in the prism strikes the opposite face which is silvered, the reflected	[2]

	ray from it retracing its path. Trace the ray diagram and find the relation between the refractive index of the material of the prism and the angle of the prism.	
0	What is meant by the term interference of light? Write any two conditions necessary for obtaining well - defined and sustained interference pattern of light.	[2]
	Section C	
1	Draw a ray diagram to show the formation of an image at the least distance of distinct vision, by a compound microscope. Hence, obtain an expression for its angular magnification.	[3]
12	1. An object is placed in front of a converging lens. Obtain the conditions under which the magnification produced by the lens is (i) negative and (ii) positive. 2. A point object is placed at O in front of a glass sphere as shown in figure.  Show the formation of image by the sphere. **OR** At what angle should a ray of light be incident on the face of a prism of refracting angle 60° so that it just suffers total internal reflection at the other face? The refractive index of the material of the prism is 1.524	[3]
13	Briefly explain how bright and dark fringes are formed on a screen due to the diffraction at a single slit. Hence, explain why the intensity at the bright fringes decreases sharply as their order (n) increases.	[3]
	Section D	
14	**Read the source given below and answer the following questions:** The lens maker's formula relates the focal length of a lens to the refractive index of the lens material and the radii of curvature of its two surfaces. This formula is called so because it is used by manufacturers to design lenses of required focal length from a glass of given refractive index. If the object is placed at infinity, the image will be formed at focus for both double convex lens and double concave lens. Therefore, lens maker's formula is, $\frac{1}{f} = \left[\frac{\mu_2 - \mu_1}{\mu_1}\right]\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$ When lens is placed in air, $\mu_1 = 1$ and $\mu_2 = \mu$. The lens maker formula takes the form, $\frac{1}{f} = (\mu - 1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$ 1. The radius of curvature of each face of biconcave lens with refractive index 1.5 is 30 cm. The focal length of the lens in air is a. 12 cm b. 10 cm c. 20 cm d. 30 cm	[4]

2. The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. If focal length is 12 cm, then refractive index of glass is

   a. 1.5

   b. 1.78

   c. 2.0

   d. 2.52

3. An under - water swimmer cannot see very clearly even in absolutely clear water because of

   a. absorption of light in water

   b. scattering of light in water

   c. reduction of speed of light in water

   d. change in the focal length of eye - lens

4. A thin lens of glass ($\mu = 1.5$) of focal length 10 cm is immersed in water ($\mu = 1.33$). The new focal length is

   a. 20 cm

   b. 40 cm

   c. 48 cm

   d. 12 cm

5. An object is immersed in a fluid. In order that the object becomes invisible, it should

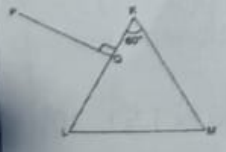
   a. behave as a perfect reflector

   b. absorb all light falling on it

   c. have refractive index one

   have refractive index exactly matching with that of the surrounding fluid.

15 A triangular prism of refracting angle 60^o is made of a transparent material of refractive index $\frac{2}{\sqrt{3}}$. A ray of light is incident normally on the face KL as shown in the figure. Trace the path of the ray as it passes through the prism and calculate the angle of emergence and angle of deviation. **[5]**



OR

Draw a ray diagram to show the formation of the image of an object placed on the axis of a convex refracting surface of radius of curvature 'R', separating the two media of refractive indices 'μ_1' and 'μ_2' ($\mu_2 > \mu_1$). Use this diagram to deduce the relation $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$, where u and v represent respectively the distance of the object and the image formed.

16 1.What is the effect on the interference fringes to a Young's double slit experiment when **[5]**

a. the separation between the two slits is decreased?

b. the width of the source slit is increased?

c. the monochromatic source is replaced by a source of white light? Justify your answer in each case.

2. The intensity at the central maxima in Young's double slit experimental set up is I_0. Show that the intensity at a pointis $\frac{I_0}{4}$, where the path difference is $\frac{\lambda}{3}$.