PART 1 - PHYSICS

Topic : Wave optics

SECTION–1 : (Maximum Marks : 28)

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **SEVEN** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, −0.33, −.30, 30.27, −127.30) in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If ONLY the correct answer is entered;
Zero Marks : 0 In all other cases.

1. In a single slit diffraction experiment, a slit of width (0.016 ± 0.002) mm is used to measure the wavelength of a monochromatic light source. In the diffraction pattern, the angular distance between the central maximum and first minimum is measured to be (2° ± 40'). The value of the fractional error in the measurement of wavelength is:
[Given: $\sin(2°) = 0.035$] [JEE Advanced 2026 Paper 2]

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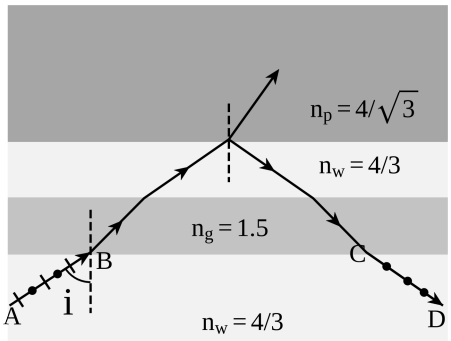
2. As shown in the figure, a ray AB of unpolarized light enters from water of refractive index $n_w = 4/3$ into a medium of refractive index $n_p = 4/\sqrt{3}$ after passing through a glass plate of refractive index $n_g = 1.5$ and a layer of water. At a particular incident angle i the reflected ray CD is polarized in the direction as shown in the figure. The value of i (in degrees) is: [JEE Advanced 2026 Paper 2]



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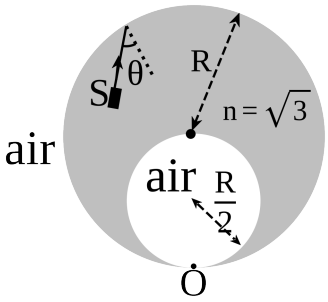
3. A solid glass sphere of refractive index $n = \sqrt{3}$ and radius R contains a spherical air cavity of radius $\frac{R}{2}$, as shown in the figure. A very thin glass layer is present at the point O so that the air cavity (refractive index n = 1) remains inside the glass sphere. An unpolarized, unidirectional and monochromatic light source S emits a light ray from a point inside the glass sphere towards the periphery of the glass sphere. If the light is reflected from the point O and is fully polarized, then the angle of incidence at the inner surface of the glass sphere is θ. The value of $\sin\theta$ is ____ [JEE Advanced 2025 Paper 1]



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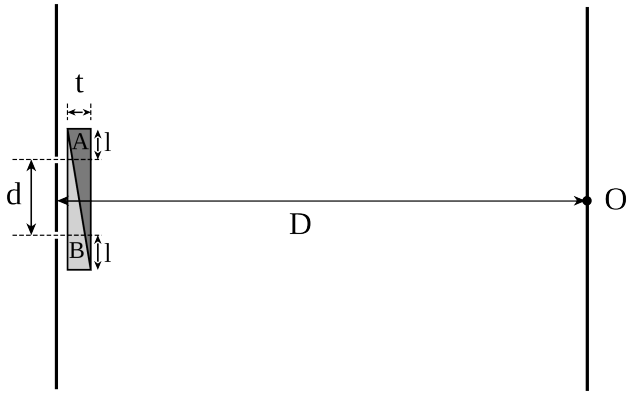
4. In a Young's double slit experiment, a combination of two glass wedges A and B, having refractive indices 1.7 and 1.5, respectively, are placed in front of the slits, as shown in the figure. The separation between the slits is d = 2 mm and the shortest distance between the slits and the screen is D = 2 m. Thickness of the combination of the wedges is t = 12 μm. The value of l as shown in the figure is 1 mm. Neglect any refraction effect at the slanted interface of the wedges. Due to the combination of the wedges, the central maximum shifts (in mm) with respect to O by ____ [JEE Advanced 2025 Paper 2]



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5. A point source S emits unpolarized light uniformly in all directions. At two points A and B, the ratio $r = I_A/I_B$ of the intensities of light is 2. If a set of two polaroids having 45° angle between their pass-axes is placed just before point B, then the new value of r will be _____. [JEE Advanced 2024 Paper 1]

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Paragraph for Questions 6 and 7

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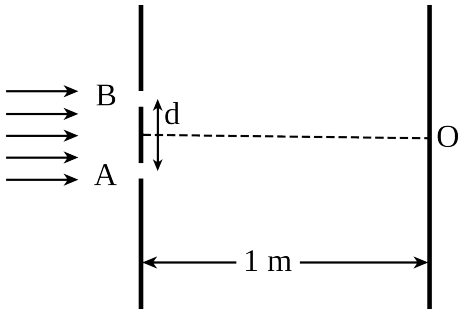
In a Young's double slit experiment, each of the two slits A and B, as shown in the figure, are oscillating about their fixed center and with a mean separation of 0.8 mm. The distance between the slits at time t is given by $d = (0.8 + 0.04\sin\omega t)$ mm, where $\omega = 0.08$ rad s^{-1}. The distance of the screen from the slits is 1 m and the wavelength of the light used to illuminate the slits is 6000 Å. The interference pattern on the screen changes with time, while the central bright fringe (zeroth fringe) remains fixed at point O.



6. The 8th bright fringe above the point O oscillates with time between two extreme positions. The separation between these two extreme positions, in micrometer (μm), is _____.

[JEE Advanced 2024 Paper 2]

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7. The maximum speed in μm/s at which the 8th bright fringe will move is _____.

[JEE Advanced 2024 Paper 2]

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SECTION–2 : (Maximum Marks : 4)

- This section contains **ONE** question.
- Each question has **TWO** lists: **List-I** and **List-II**.
- Four options are given representing matching of elements from List-I and List-II. **ONLY ONE** of these four options corresponds to a correct matching.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If ONLY the correct option is chosen;
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);
Negative Marks : −1 In all other cases.

8. In the **List-I**, four optical effects are mentioned. The physical phenomena of light which are essential to describe these optical effects are given in **List-II**. Choose the option which describes the correct match between the entries in **List-I** to those in **List-II**. [JEE Advanced 2026 Paper 1]

List-I		List-II	
P.	Colorful sky in north polar region (Aurora Borealis)	1.	Dispersion and reflection
Q.	Partially polarized sun light	2.	Total internal reflection
R.	Rainbow	3.	Diffraction
S.	Dark and bright fringes	4.	Scattering of light by molecules in the atmosphere
		5.	Emission of radiation from oxygen and nitrogen atoms excited by charged particles

(A) $P \to 5, Q \to 4, R \to 1, S \to 3$
(B) $P \to 4, Q \to 2, R \to 1, S \to 3$
(C) $P \to 4, Q \to 1, R \to 2, S \to 3$
(D) $P \to 5, Q \to 4, R \to 1, S \to 2$

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JEE ADVANCED WAVE OPTICS — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–1

Ques.	1	2	3	4	5	6	7		
Ans.	**0.43 to 0.50**	**60**	**0.75**	**1.2**	**8**	**600.00 to 602.00**	**24.00 to 24.15**		

SECTION–2

Ques.	8																												
Ans.	**A**																												