PART 1 - PHYSICS

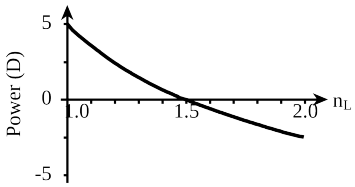
Topic : Ray optics and optical instruments

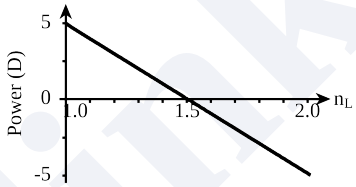
SECTION–1 : (Maximum Marks : 6)

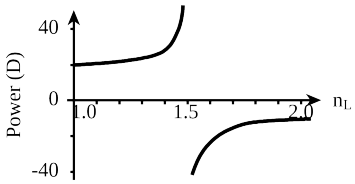
- This section contains **TWO** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

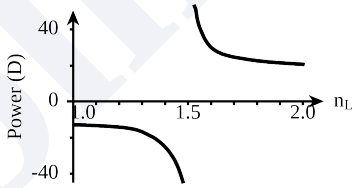
Full Marks	: +3	If ONLY the correct option is chosen;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	: −1	In all other cases.

1. A double convex lens made of glass of refractive index 1.5 and radii of curvature of the curved surfaces 20 cm each is immersed in a liquid of refractive index n_L. The correct plot showing the variation of the power, in the units of diopter (D), as a function of n_L is: [JEE Advanced 2026 Paper 1]

(A)


(B)


(C)


(D)


Scan or tap for the full solution

2. A beam of polychromatic light passes through a thin prism of prism angle 6°. The refractive index of the material of the prism varies with wavelength (λ) as $n(\lambda) = \alpha\lambda + \frac{\beta}{\lambda^2}$, where $\alpha = 3\ \mu m^{-1}$ and $\beta = 0.096\ \mu m^2$. If λ_{min} is the wavelength at which the angle of minimum deviation D_m is smallest, then the correct value of D_m at λ_{min} is [JEE Advanced 2026 Paper 2]

(A) 6.4° (B) 4.8° (C) 3.2° (D) 2.4°

Solution

Space for Rough Work

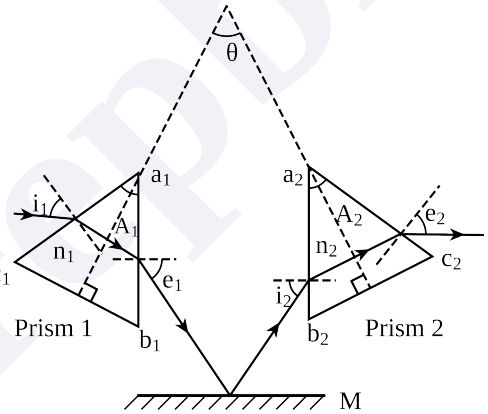
SECTION–2 : (Maximum Marks : 12)

- This section contains **THREE** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks	: +4	ONLY if (all) the correct option(s) is(are) chosen;
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen;
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct;
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	: −2	In all other cases.

- For example, in a question, if **(A), (B) and (D)** are the ONLY three options corresponding to correct answers, then choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get −2 marks.

3. Consider two isosceles prisms 1 and 2 with prism angles A_1 and A_2 and refractive indices n_1 and n_2, respectively, as shown in the figure. The faces a_1b_1 and a_2b_2 are parallel to each other and perpendicular to the mirror M. If a ray of light is incident on the face a_1c_1 and emerges from the face a_2c_2, then the correct statement(s) is/are: [JEE Advanced 2026 Paper 2]



Space for Rough Work

(A) If both the prisms are at minimum deviation condition, then $\frac{n_2}{n_1} = \sin\left(\frac{A_1}{2}\right)/\sin\left(\frac{A_2}{2}\right)$.

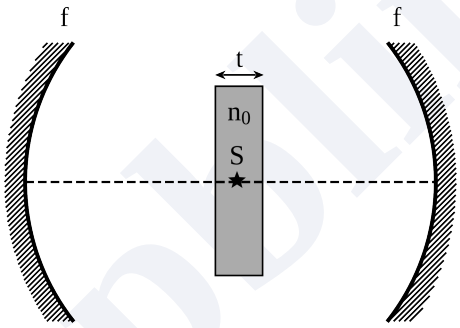
(B) If prism 2 is at minimum deviation condition, then $\sin i_1 = n_2 \sin\left(\frac{A_2}{2}\right)$ is always true.

(C) If both the prisms 1 and 2 are thin and are at minimum deviation condition with angles of deviation δ_{m1} and δ_{m2}, respectively, then $\theta = \frac{\delta_{m1}}{2(n_1 - 1)} + \frac{\delta_{m2}}{2(n_2 - 1)}$.

(D) If prism 1 is at minimum deviation condition, then $\sin i_2 = n_1 \sin\left(\frac{A_1}{2}\right)$ is always true.

Solution

4. Two identical concave mirrors each of focal length f are facing each other as shown in the schematic diagram. The focal length f is much larger than the size of the mirrors. A glass slab of thickness t and refractive index n_0 is kept equidistant from the mirrors and perpendicular to their common principal axis. A monochromatic point light source S is embedded at the center of the slab on the principal axis, as shown in the schematic diagram. For the image to be formed on S itself, which of the following distances between the two mirrors is/are correct: [JEE Advanced 2025 Paper 2]

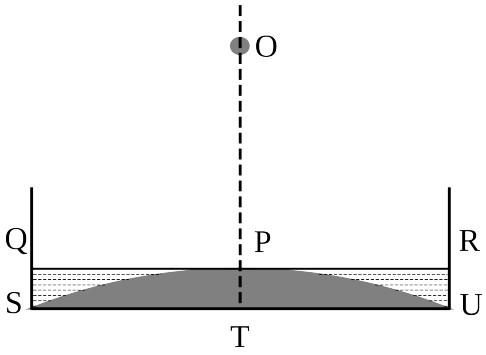


(A) $4f + \left(1 - \frac{1}{n_0}\right)t$ (B) $2f + \left(1 - \frac{1}{n_0}\right)t$ (C) $4f + (n_0 - 1)t$ (D) $2f + (n_0 - 1)t$

Scan or tap for the full solution

5. A glass beaker has a solid, plano-convex base of refractive index 1.60, as shown in the figure. The radius of curvature of the convex surface (SPU) is 9 cm, while the planar surface (STU) acts as a mirror. This beaker is filled with a liquid of refractive index n up to the level QPR. If the image of a point object O at a height of h (OT in the figure) is formed onto itself, then, which of the following option(s) is(are) correct? [JEE Advanced 2024 Paper 1]

Space for Rough Work



(A) For n = 1.42, h = 50 cm.

(B) For n = 1.35, h = 36 cm.

(C) For n = 1.45, h = 65 cm.

(D) For n = 1.48, h = 85 cm.

Solution

Prepblink

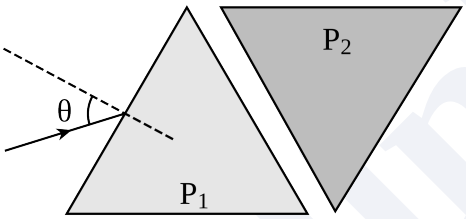
Space for Rough Work

SECTION–3 : (Maximum Marks : 4)

- This section contains **ONE** question.
- The answer to each question is a **NON-NEGATIVE INTEGER**.
- For each question, enter the correct integer corresponding to the answer 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.

6. Two equilateral-triangular prisms P_1 and P_2 are kept with their sides parallel to each other, in vacuum, as shown in the figure. A light ray enters prism P_1 at an angle of incidence θ such that the outgoing ray undergoes minimum deviation in prism P_2. If the respective refractive indices of P_1 and P_2 are $\sqrt{\frac{3}{2}}$ and $\sqrt{3}$, then $\theta = \sin^{-1}\left[\sqrt{\frac{3}{2}}\sin\left(\frac{\pi}{\beta}\right)\right]$, where the value of β is _____. [JEE Advanced 2024 Paper 2]



Scan or tap for the full solution

Space for Rough Work

SECTION–4 : (Maximum Marks : 3)

- 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 : +3 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.

7. A light ray is incident on the surface of a sphere of refractive index n at an angle of incidence θ_0. The ray partially refracts into the sphere with angle of refraction φ_0 and then partly reflects from the back surface. The reflected ray then emerges out of the sphere after a partial refraction. The total angle of deviation of the emergent ray with respect to the incident ray is α. Match the quantities mentioned in **List-I** with their values in **List-II** and choose the correct option. [JEE Advanced 2024 Paper 1]

	List-I		List-II
P.	If n = 2 and $\alpha = 180°$, then all the possible values of θ_0 will be	1.	30° and 0°
Q.	If $n = \sqrt{3}$ and $\alpha = 180°$, then all the possible values of θ_0 will be	2.	60° and 0°
R.	If $n = \sqrt{3}$ and $\alpha = 180°$, then all the possible values of φ_0 will be	3.	45° and 0°
S.	If $n = \sqrt{2}$ and $\theta_0 = 45°$, then all the possible values of α will be	4.	150°
		5.	0°

(A) P → 5; Q → 2; R → 1; S → 4
(B) P → 5; Q → 1; R → 2; S → 4
(C) P → 3; Q → 2; R → 1; S → 4
(D) P → 3; Q → 1; R → 2; S → 5

Solution

Space for Rough Work

JEE ADVANCED RAY OPTICS AND OPTICAL INSTRUMENTS — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–1

Ques.	1	2
Ans.	A	B

SECTION–2

Ques.	3	4	5
Ans.	A, C, D	A, B	A, B

SECTION–3

Ques.	6
Ans.	12

SECTION–4

Ques.	7
Ans.	A

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