

# PYQSide

## JEE MAIN RAY OPTICS AND OPTICAL INSTRUMENTS — TOTAL INTERNAL REFLECTION AND ITS APPLICATIONS (OPTICAL FIBRES, PRISMS) — PYQS

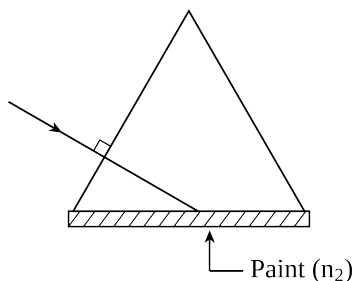
Max. Marks: 24

Questions: 6

### Section A (MCQ)

- Q.1** One side of an equilateral prism is painted by a transparent material of refractive index  $n_2$ . The refractive index of prism is 1.6. The minimum value of  $n_2$  required for total internal reflection from painted face is \_\_\_\_\_.

[JEE Main 2026 (Online) 2nd April Evening Shift]



- (1)  $\frac{3\sqrt{3}}{1.6}$  (2)  $\sqrt{3}$  (3)  $\frac{3.2}{\sqrt{3}}$  (4)  $\frac{4\sqrt{3}}{5}$

Scan or tap for the full solution



- Q.2** Consider light travelling from a medium A to medium B separated by a plane interface. If the light undergoes total internal reflection during its travel from medium A to B and the speed of light in media A and B are  $2.4 \times 10^8$  m/s and  $2.7 \times 10^8$  m/s, respectively, then the value of critical angle is :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1)  $\cos^{-1}\left(\frac{8}{9}\right)$  (2)  $\sin^{-1}\left(\frac{9}{8}\right)$   
 (3)  $\cot^{-1}\left(\frac{3}{\sqrt{13}}\right)$  (4)  $\tan^{-1}\left(\frac{8}{\sqrt{17}}\right)$

Scan or tap for the full solution



- Q.3** A prism of angle  $75^\circ$  and refractive index  $\sqrt{3}$  is coated with thin film of refractive index 1.5 only at the back exit surface. To have total internal reflection at the back exit surface the incident angle must be \_\_\_\_\_  
 ( $\sin 15^\circ = 0.25$  and  $\sin 25^\circ = 0.43$ )

[JEE Main 2026 (Online) 23rd January Evening Shift]

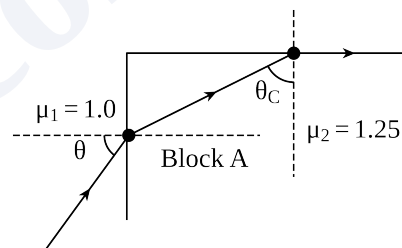
- (1) between  $15^\circ$  and  $20^\circ$  (2)  $15^\circ$   
 (3)  $< 15^\circ$  (4)  $> 25^\circ$

Scan or tap for the full solution



- Q.4** A transparent block A having refractive index  $\mu = 1.25$  is surrounded by another medium of refractive index  $\mu = 1.0$  as shown in the figure. A light ray is incident on the flat face of the block with incident angle  $\theta$  as shown in the figure. What is the maximum value of  $\theta$  for which light suffers total internal reflection at the top surface of the block?

[JEE Main 2025 (Online) 7th April Evening Shift]



- (1)  $\tan^{-1}(4/3)$  (2)  $\sin^{-1}(3/4)$   
 (3)  $\tan^{-1}(3/4)$  (4)  $\cos^{-1}(3/4)$

Scan or tap for the full solution



- Q.5** At the interface between two materials having refractive indices  $n_1$  and  $n_2$ , the critical angle for reflection of an em wave is  $\theta_{1C}$ . The  $n_2$  material is replaced by another material having refractive index  $n_3$  such that the critical angle at the interface between  $n_1$  and  $n_3$  materials is  $\theta_{2C}$ . If  $n_3 > n_2 > n_1$ ;  $\frac{n_2}{n_3} = \frac{2}{5}$  and  $\sin \theta_{2C} - \sin \theta_{1C} = \frac{1}{2}$ , then  $\theta_{1C}$  is :

[JEE Main 2025 (Online) 29th January Morning Shift]

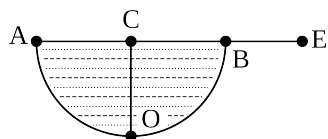
- (1)  $\sin^{-1}\left(\frac{1}{6n_1}\right)$  (2)  $\sin^{-1}\left(\frac{1}{3n_1}\right)$   
 (3)  $\sin^{-1}\left(\frac{5}{6n_1}\right)$  (4)  $\sin^{-1}\left(\frac{2}{3n_1}\right)$

Scan or tap for the full solution



- Q.6** A hemispherical vessel is completely filled with a liquid of refractive index  $\mu$ . A small coin is kept at the lowest point (O) of the vessel as shown in figure. The minimum value of the refractive index of the liquid so that a person can see the coin from point E (at the level of the vessel) is \_\_\_\_\_.

[JEE Main 2025 (Online) 28th January Morning Shift]



- (1)  $\frac{3}{2}$       (2)  $\frac{\sqrt{3}}{2}$       (3)  $\sqrt{3}$       (4)  $\sqrt{2}$

Scan or tap for the  
full solution



### ANSWER KEY

| Ques. | 1 | 2 | 3       | 4 | 5 | 6 |  |
|-------|---|---|---------|---|---|---|--|
| Ans.  | 4 | 4 | 1, 2, 3 | 2 | — | 4 |  |