

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

Max. Marks: 44

Questions: 11

Section A (MCQ) — 11 questions

Q.1 Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium? [NEET (UG) 2023]

- (1) $\sin^{-1}\left(\frac{10t_2}{t_1}\right)$ (2) $\sin^{-1}\left(\frac{t_1}{10t_2}\right)$
 (3) $\sin^{-1}\left(\frac{10t_1}{t_2}\right)$ (4) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$

Scan or tap for the full solution



Q.2 Two transparent media A and B are separated by a plane boundary. The speed of light in those media are 1.5×10^8 m/s and 2.0×10^8 m/s, respectively. The critical angle for a ray of light for these two media is [NEET (UG) 2022]

- (1) $\sin^{-1}(0.500)$ (2) $\sin^{-1}(0.750)$
 (3) $\tan^{-1}(0.500)$ (4) $\tan^{-1}(0.750)$

Scan or tap for the full solution



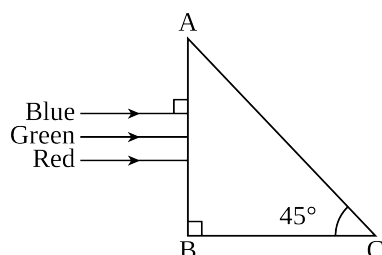
Q.3 In total internal reflection when the angle of incidence is equal to the critical angle for the pair of media in contact, what will be angle of refraction? [NEET (UG) 2019]

- (1) equal to angle of incidence
 (2) 90°
 (3) 180°
 (4) 0°

Scan or tap for the full solution



Q.4 A beam of light consisting of red, green and blue colours is incident on a right angled prism. The refractive index of the material of the prism for the above red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively.



The prism will [AIPMT 2015]

- (1) not separate the three colours at all
 (2) separate the red colour part from the green and blue colours
 (3) separate the blue colour part from the red and green colours
 (4) separate all the three colours from one another

Scan or tap for the full solution



Q.5 Which of the following is not due to total internal reflection? [AIPMT 2011 (Prelims)]

- (1) Working of optical fibre
 (2) Difference between apparent and real depth of a pond
 (3) Mirage on hot summer days
 (4) Brilliance of diamond

Scan or tap for the full solution



Q.6 The speed of light in media M_1 and M_2 are 1.5×10^8 m/s and 2.0×10^8 m/s respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle i . If the ray suffers total internal reflection, the value of i is [AIPMT 2010 (Mains)]

- (1) Equal to $\sin^{-1}\left(\frac{2}{3}\right)$
 (2) Equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$
 (3) Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$
 (4) Less than $\sin^{-1}\left(\frac{2}{3}\right)$

Scan or tap for the full solution



Q.7 A ray of light travelling in a transparent medium of refractive index μ , falls on a surface separating the medium from air at an angle of incidence of 45° . For which of the following value of μ the ray can undergo total internal reflection?

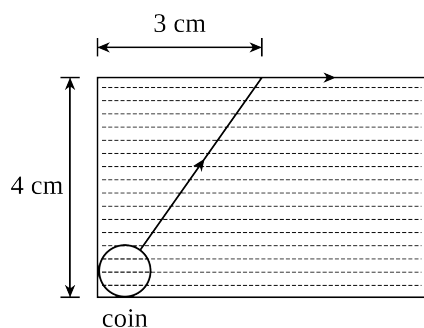
[AIPMT 2010 (Prelims)]

(1) $\mu = 1.33$ (2) $\mu = 1.40$ (3) $\mu = 1.50$ (4) $\mu = 1.25$

Scan or tap for the
full solution



- Q.8** A small coin is resting on the bottom of a beaker filled with liquid. A ray of light from the coin travels up to the surface of the liquid and moves along its surface. How fast is the light travelling in the liquid? [AIPMT 2007]

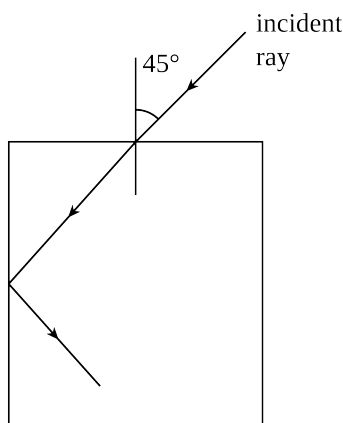


- (1) 2.4×10^8 m/s (2) 3.0×10^8 m/s
(3) 1.2×10^8 m/s (4) 1.8×10^8 m/s

Scan or tap for the
full solution



- Q.9** For the given incident ray as shown in the figure, for total internal reflection of this ray, the required refractive index of the prism will be [AIPMT 2002]



- (1) $\frac{\sqrt{3}+1}{2}$ (2) $\frac{\sqrt{2}+1}{2}$
(3) $\sqrt{\frac{3}{2}}$ (4) $\sqrt{\frac{7}{6}}$

Scan or tap for the
full solution



- Q.10** Optical fibres are based on [AIPMT 2001]
(1) total internal reflection
(2) less scattering
(3) refraction
(4) less absorption coefficient

Scan or tap for the
full solution



- Q.11** A disc is placed on a surface of pond which has refractive index $5/3$. A source of light is placed 4 m below the surface of liquid. The minimum radius of disc needed so that light is not coming out is [AIPMT 2001]

- (1) ∞ (2) 3 m (3) 6 m (4) 4 m

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	2	2	2	2	3	3	4	3	1	2