

Questions from 3. Chand.

12. (a) calculate the absolute refraction index of flint glass and crown glass,

$$\text{Ans) } \mu_{fg} = \frac{3 \times 10^8}{1.86 \times 10^8} = 1.61$$

$$\mu_{cg} = \frac{3 \times 10^8}{1.97 \times 10^8} = 1.52$$

$$\text{b) } \mu_{fg} = \frac{1.97 \times 10^8}{1.86 \times 10^8} = 1.05$$

13. The speed of light in air is 3×10^8 m/s. In medium X its speed is 2×10^8 m/s and in medium Y the speed is 2.5×10^8 m/s. calculate:

$$\text{(a) } \mu_x = \frac{3 \times 10^8}{2 \times 10^8} = 1.5$$

$$\text{(b) } \mu_y = \frac{3 \times 10^8}{2.5 \times 10^8} = 1.2$$

$$\text{(c) } \mu_{xy} = \frac{2 \times 10^8}{2.5 \times 10^8} = 0.8$$

14. What is the speed of light in the medium of refractive index $\frac{6}{5}$ if its speed in air is $3,00,000 \text{ km/s}$.

$$M_{\text{Medium}} = \frac{\text{speed of light in air}}{\text{speed of light in med}} = \frac{6}{5}$$

$$\frac{3,00,00,000 \text{ m/s}}{\text{speed of light in med}} = \frac{6}{5}$$

$$\text{speed of light} = \frac{3 \times 10^8 \times 5}{6}$$

$$= 2,50,00,000 = \text{~~2,50,00,000~~}$$

$$= 2.5 \times 10^8$$

15. The refractive index of glass is 1.5. Calculate the speed of light in glass.

$$\text{Ans)} \quad M_{\text{air glass}} = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$$

$$1.5 = \frac{3 \times 10^8}{\text{speed of light in glass.}}$$

$$\text{speed of light in glass} = \frac{3 \times 10^8}{1.5}$$

$$= 2 \times 10^8$$

16. The speed of light in water is $2.25 \times 10^8 \text{ m/s}$. If the speed of light in vacuum be $3 \times 10^8 \text{ m/s}$ calculate the refractive index of water.

Ans) $\mu_{\text{water}}^{\text{vacuum}} = \frac{3 \times 10^8}{2.25 \times 10^8}$

$$= 1.33$$

17. Light enters from air into diamond which has a refractive index of 2.42. Calculate the speed of light in diamond.

Ans) speed of light in diamond.

$$= \frac{\text{speed of light in air}}{\text{refractive index of diamond}}$$

$$= \frac{3 \times 10^8}{2.42}$$

$$= 1.2 \times 10^8$$

M C Q's

19. The refractive indices of four substances P, Q, R and S are 1.5, 1.36, 1.77 and 1.31 respectively. The speed of light is the maximum in the substance

Ans) (d) S

20. The refractive indices of four materials A, B, C and D are 1.33, 1.43, 1.71, 1.52 respectively. When the light rays pass from air into these materials, they refract the maximum in.

Ans) (c) material C

21. The refractive index of glass for light going from air to glass is $\frac{3}{2}$. The refractive index for light going from glass to air will be.

Ans) (c) $\frac{4}{6}$

22. The refractive indices of four media A, B, C and D are 1.44, 1.52, 1.65 and 1.36 respectively. When light travelling in air is incident in these media at equal angles, the angle of refraction will be the minimum.

Ans) (d) in medium C

23. The speed of light in substance X is 1.25×10^8 m/s and that in air is 3×10^8 m/s. The refractive index of this substance will be:

Ans) (a) 2.4

24. The refractive indexes of four substances P, Q, R and S are 1.77, 1.50, 1.42 and 1.31 respectively. When light travelling in air is incident on these substances at equal angle, the angle of refraction will be the maximum in:

Ans) (d) substance S.

Q5. The refractive index of water is:

Ans) (a) 1.33

Q6. The refractive index of water with respect to air is $\frac{4}{3}$. The refractive index of air with respect to water will be:

Ans) (c) 0.75

Q7. Refractive indices of water, sulphuric acid, glass and carbon disulphide are 1.33, 1.43, 1.53 and 1.63 respectively. The light travels slowest in.

Ans) (d) carbon disulphide

Q8. The refractive index of glass with respect to air is $\frac{3}{2}$ and the refractive index of water with respect to air is $\frac{4}{3}$, the refractive index of glass with respect to water will be:

Ans) (d) 1.125