12(a) * Absolute refractive index of flint glass

$$= \frac{c}{V_{flintglass}} = \frac{3.00 \times 10^8 \, m/s}{1.86 \times 10^8 \, m/s}$$

$$= \frac{300}{186} = \frac{150}{62} = 1.61$$

* Absolute refractive index of crown glass

$$= \frac{c}{V_{crown glass}} = \frac{3.00 \times 10^8 \, m/s}{1.97 \times 10^8 \, m/s}$$

$$= \frac{300}{197} = 1.52$$

(b) Relative refractive index for light going from crown glass to flint glass.

$$= {}_{crown glass} n_{flint glass} = \frac{V_{crown glass}}{V_{flint glass}} = \frac{1.97 \times 10^8 \, m/s}{1.86 \times 10^8 \, m/s}$$

$$= \frac{197}{186} = 1.059$$

13y

$$c = 3 \times 10^8 \, m/s$$

$$V_x = 2 \times 10^8 \, m/s$$

$$V_y = 2.5 \times 10^8 \, m/s$$

(a) air $n_x = \frac{3 \times 10^8 \, m/s}{2 \times 10^8 \, m/s} = 1.5$.

(b) $_{air}n_y = \dfrac{3 \times 10^8 m/s}{2.5 \times 10^8 m/s} = \dfrac{3}{2.5} = 1.2$

(c) $_xn_y = \dfrac{v_x}{v_y} = \dfrac{2 \times 10^8 m/s}{2.5 \times 10^8 m/s} = 0.8$

14. Speed in air $= 3,00,000 km/s = (3 \times 10^5 \times 10^3) m/s$

$\qquad\qquad\qquad\qquad\qquad\qquad = 3 \times 10^8 m/s$

Refractive index of medium $= 6/5$

A.Q

$\dfrac{c}{v} = \dfrac{6}{5}$

$\Rightarrow \dfrac{3 \times 10^8 m/s}{v} = \dfrac{6}{5}$

$\Rightarrow v = \dfrac{3 \times 10^8 \times 5}{6^2} = 5 \times 5 \times 10^7 = 25 \times 10^7$

$\qquad\qquad\qquad\qquad\qquad = 2.5 \times 10^8 m/s$

$\qquad\qquad\qquad\qquad\qquad = 2,50,000 km/s$

15. Refractive index of glass $= 1.5$

$\qquad\qquad c = 3 \times 10^8 m/s$

$\dfrac{0.Q}{v}$

$\dfrac{c}{v} = 1.5 = \dfrac{15}{10}$

$\Rightarrow \dfrac{3 \times 10^8 m/s}{v} = 1.5$

$\Rightarrow v = \dfrac{3 \times 10^8 m/s}{1.5} = 2 \times 10^8 m/s$

16c Speed of light in water = 2.25×10^8 m/s
Speed of light in vaccum , $C = 3 \times 10^8$ m/s.

∴ Refractive index of water = $\dfrac{c}{V_{water}} = \dfrac{3 \times 10^8}{2.25 \times 10^8}$

$= \dfrac{300}{225} = \dfrac{60}{45} = \dfrac{4}{3} = 1.33$

17c Refractive index of diamond = 2.42

$C = 3.0 \times 10^8$ m/s let speed of light in diamond = V

A.Q

$\dfrac{c}{V} = 2.42$

$\Rightarrow V = \dfrac{3 \times 10^8}{2.42} = \dfrac{300}{242} \times 10^8 = \dfrac{150}{121} \times 10^8 = 1.24 \times 10^8$ m/s

MCQs

19c Refractive index $= \dfrac{C}{V}$

∴ Refractive index $\alpha \; \dfrac{1}{V}$

∴ If velocity of light in medium is less then the value of

n is more and vice-versa.

Here, the refractive index of S is least.

∴ Speed of light is maximum in S.

Ans-option - (d)

20c Refractive index $= \dfrac{C}{V}$

$\Rightarrow n \; \alpha \; \dfrac{1}{V}$

Here, the material C has the ~~most~~ highest value of refractive index.

∴ The velocity of light in medium C is the least.

⇒ The material C is the densiest one among others.

∴ When the light rays pass from air into C, they refract the maximum.

ans Option – (c)

21) $air^{n}glass = 3/2$

∴ $glass^{n}air = 1 \div 3/2 = 2/3$ $\left[\because n_2 = \dfrac{1}{2n_1} \right]$

ans – Option (c) $4/6$

22) $n_\alpha \frac{1}{v}$

Here, the media C has maximum refractive index.

∴ velocity of light in C is minimum

⇒ The density of medium in C is least.

∴ The angle of refraction will be minimum in medium C

ans – Option (c)

23) Refractive index = $\dfrac{c}{v}$

∴ $n = \dfrac{3 \times 10^8}{1.25 \times 10^8} = \dfrac{300}{125} = \dfrac{60}{25} = 2.4$

Option (a)

.24. $\quad n \propto \frac{1}{v}$

Here, substance S has minimum refractive index.

∴ Velocity of light in S is maximum.

⇒ Density of S is minimum

∴ Angle of refraction will be maximum in substance S.
Option (d)

25. (a) 1.33

26. $\quad_{air}n_{water} = \frac{4}{3}$

$\therefore \quad_{w}n_a = \frac{3}{4} \qquad \left[_1n_2 = \frac{1}{_2n_1}\right]$

$= (c)\ 0.75$

27. $\quad n \propto \frac{1}{v}$

Here, the refractive index of CS_2 is maximum

∴ The velocity light in CS_2 is least.

∴ option (d) carbon disulphide

28. $\quad_{air}n_{glass} = \frac{3}{2}$

$_{air}n_{water} = 4/3$

$\therefore \quad_{water}n_{glass} = \frac{n_{glass}}{n_{water}} = \frac{3}{2} \times \frac{3}{4} = \frac{9}{8}$

= 1.125

∴ Answer - option (d) 1.125