

## PHYSICS

41. (2)

It is due to scattering of light.

$$\text{Scattering} \propto \frac{1}{\lambda^4}.$$

Hence, the light reaches us is rich in red.

42. (3)

$$\frac{1}{f} = (\mu_g - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right), \text{ where, } \mu_g = 1 \text{ is}$$

given.

$$\Rightarrow \frac{1}{f} = (1-1) \left( \frac{1}{R_1} + \frac{1}{R_2} \right) = 0 \Rightarrow f = \infty$$

43. (3)

From the formula,

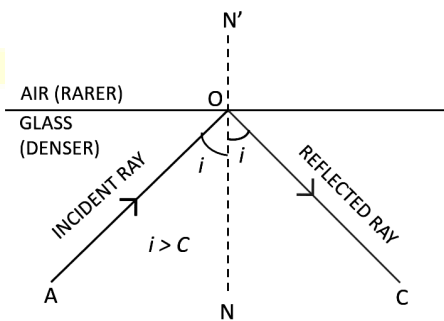
$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{25} - \frac{1}{25} = 0$$

$$\text{Power of combination} = \frac{1}{f} = 0$$

44. (3)

45. (4)

For the total internal reflection when  $i = i_c$ , then refracted ray grazes with the surface. That means the angle of refraction  $r = 90^\circ$ .



46. (1)

Wavefront is the locus of all points, where the particles of the medium vibrate with the same phase.

47. (4)

If source are coherent

$$I_R = I_1 + I_2 + 2\sqrt{I_1 I_2} \cos \phi$$

If source are incoherent,

$$I_R = I_1 + I_2 + 2I = \frac{4I}{2} = \frac{I_0}{2}$$

48. (2)

The wavelength of light in water  $\left( \lambda_w = \frac{\lambda_a}{\mu} \right)$  is

less than that in air. When the set-up is immersed in water, fringe width  $\beta (\propto \lambda)$  will decrease.

49. (2)

For constructive interference  $d \sin \theta = n\lambda$ 

given  $d = 2\lambda \Rightarrow \sin \theta = \frac{n}{2}$ , where  $n = 0, 1, -1,$

$2, -2$  hence five maxima are possible

50. (1)

Let  $\theta$  be the angular width in water.

We know angular width  $= \frac{\lambda}{d}$

Angular width  $\propto \lambda$ 

$$\frac{\theta}{0.4^\circ} = \frac{\lambda_w}{\lambda_a} \dots (i)$$

$$\text{Now, } {}_a\mu_w = \frac{\lambda_a}{\lambda_w} \Rightarrow \frac{\lambda_a}{\lambda_w} = \frac{4}{3}$$

Hence from eq. (1), we have

$$\frac{\theta}{0.4^\circ} = \frac{3}{4} \Rightarrow \theta = 0.3^\circ$$