DPP

DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 2

Topic :- WAVE OPTICS

1 **(c)**

Frequency is independent of medium

2 **(a)**

$d_1 = 7\lambda_1 \frac{D}{d}$

And $d_2 = 7\lambda_2 \frac{D}{d}$

$\therefore \frac{d_1}{d_2} = \frac{\lambda_1}{\lambda_2}$

4 **(c)**

In 1678 Huygen proposed the wave theory of light. According to Huygen, light travels in the form of waves. These waves after emerging from the light source travel in all directions with the velocity of light. Since, waves require a medium to travel Huygen proposed an all pervading medium ether.

5 **(d)**

$\because n = 3, \therefore 2n\pi = 2 \times 3\pi = 6\pi$

6 **(d)**

Laser beams are perfectly parallel. So that they are very narrow and can travel a long distance without spreading. This is the feature of laser while they are monochromatic and coherent these are characteristics only

7 **(c)**

Position of first minima = position of third maxima *i.e.*,

$\frac{1 \times \lambda_1 D}{d} = \frac{(2 \times 3 + 1)}{2} \frac{\lambda_2 D}{d} \Rightarrow \lambda_1 = 3.5\lambda_2$

8 **(a)**

$S_2P = (d^2 + b^2)^{1/2} = d\left(1 + \frac{b^2}{d^2}\right)^{1/2}$

$$= d\left(1 + \frac{b^2}{d^2}\right) = d + \frac{b^2}{2d}$$

Path difference$= S_2P - S_1P$

$$x = d + \frac{b^2}{d^2} - d = b^2/2d$$

For missing wavelengths $(2n-1)\frac{\lambda}{2} = x = \frac{b^2}{2d}$

For $n = 1, \lambda = \frac{b^2}{d},$

For $n = 2, \lambda = \frac{2b^2}{3d},$

9 **(d)**

In the arrangement shown, the unpolarised light is incident at polarizing angle of $90° - 33° = 57°$. The reflected light is thus plane polarized light. When plane polarized light is passed through Nicol prism (a polarizer or analyser), the intensity gradually reduces to zero and finally increases

10 **(c)**

Angular fringe width is the ratio of fringe width to distance (D) of screen from the source *ie*,

$$\theta = \frac{\beta}{D}$$

As D is taken large, hence angular fringe width of the central maximum will decrease.

11 **(a)**

$\lambda_{\gamma-rays} < \lambda_{x-rays} < \lambda_{\alpha-rays} < \lambda_{\beta-rays}$

12 **(d)**

$\lambda_{Radiowave} > \lambda_{IR\ rays} > \lambda_{UV\ rays} > \lambda_{X-rays}$

13 **(d)**

$I = \frac{R_2^2}{4}$ given $n_1b_1 = n_2b_2 \Rightarrow 1 \times 200 = n_2 \times 25$

$\therefore n_2 = 8\ HPZ$

$$\therefore I = \left(\frac{R_9}{2}\right)^2$$

$$= \left(\frac{R_9}{R_8} \times \frac{R_8}{R_7} \times \frac{R_7}{R_6} \times \frac{R_6}{R_5} \times \frac{R_5}{R_4} \times \frac{R_4}{R_3} \times \frac{R_3}{R_2} \times \frac{R_2}{R_2}\right)^2$$

$$= \left(\frac{R_9}{R_2}\right)^2 I$$

14 **(a)**

If thin film appears dark

$2\mu t\cos r = n\lambda$ for normal incidence $r = 0°$

$\Rightarrow 2\mu t = n\lambda \Rightarrow t = \frac{n\lambda}{2\mu}$

$\Rightarrow t_{\min} = \frac{\lambda}{2\mu} = \frac{5890 \times 10^{-10}}{2 \times 1} = 2.945 \times 10^{-7} m$

15 **(c)**

$\theta_P + r = 90°$ or $r = 90° - \theta_P = 90° - 53°4' = 36°56'$

16 **(a)**

$\beta = \frac{\lambda D}{d}$

19 **(a)**

$\Delta\lambda = \lambda.\frac{v}{c} = \frac{1.5 \times 10^6}{3 \times 10^8} \times 5000 = 25Å$

20 **(d)**

$\beta = \frac{\lambda D}{d} \Rightarrow d = \frac{\lambda D}{\beta} = \frac{6000 \times 10^{-10} \times (40 \times 10^{-2})}{0.012 \times 10^{-2}} = 0.2cm$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	A	B	C	D	D	C	A	D	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	D	D	A	C	A	B	A	A	D