DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 3

Topic :- WAVE OPTICS

1 **(a)**
Photoelectric effect and Compton effect cannot be explained on the basis of wave nature of light while polarization and optical activity can be explained.

2 **(c)**
For brightness, path difference $= n\lambda = 2\lambda$
So second is bright

3 **(c)**
From Brewster's law,

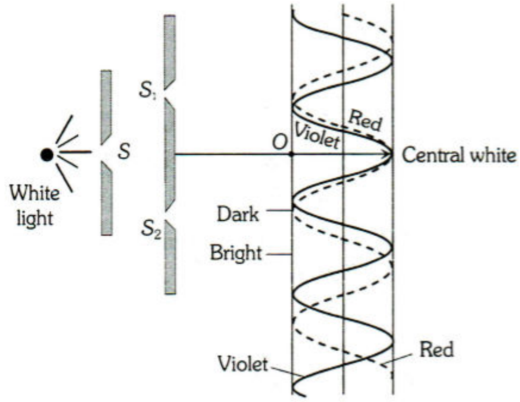
$$\mu = \tan i_p$$

$$\Rightarrow \frac{c}{v} = \tan 60° = \sqrt{3}$$

$$\Rightarrow v = \frac{c}{\sqrt{3}} = \frac{3 \times 10^8}{\sqrt{3}}$$

$$= \sqrt{3} \times \frac{10^8 \text{m}}{\text{s}}$$

4 **(c)**
In Young's double slit experiment, if white light is used in place of monochromatic light, then the central fringe is white and some coloured fringes around the central fringe are formed



Since $\beta_{red} > \beta_{violet}$ etc., the bright fringe of violet colour forms first and that of the red forms later

It may be noted that, the inner edge of the dark fringe is red, while the outer edge is violet. Similarly, the inner edge of the bright fringe is violet and the outer edge is red

5 **(a)**

Corpuscular theory explains refraction of light

6 **(b)**

When path difference is λ, $I_{max} = 4I = K$

When path difference is $\frac{\lambda}{4}$, phase difference, $\phi = \pi/2$

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

$$= I + I = 2I = \frac{K}{2}$$

7 **(c)**

$$I = I_0\left(\frac{\sin\theta}{\theta}\right)^2$$

And $\theta = \frac{\pi}{\lambda}\left(\frac{ay}{D}\right)$

For principal maximum $y = 0$

$\therefore \ \theta = 0$

Hence, intensity will remain same.

8 **(d)**

$v_{\gamma-rays} > v_{\text{visible radiation}} > v_{\text{Infrared}} > v_{\text{Radio waves}}$

9 **(d)**

Greater is the wavelength of wave higher will be its degree of diffraction.

10 **(b)**

$\lambda = 6000\ \text{Å} = 6 \times 10^{-7}$ m

Path difference for dark fringe $\Delta x = (2n+1)\frac{\lambda}{2}$

For third dark fringe $n = 2$

$$\therefore\ \Delta x = (2 \times 2 + 1) \times \frac{6 \times 10^{-7}}{2}$$

$$= \frac{5 \times 6 \times 10^{-7}}{2}$$

$$= 15 \times 10^{-7}$$

$$= 1.5 \times 10^{-6}\ \text{m} = 1.5\mu$$

11 **(b)**

Distance between n^{th} bright fringe and m^{th} dark fringe $(n > m)$

$$\Delta x = \left(n - m + \frac{1}{2}\right)\beta = \left(5 - 3 + \frac{1}{2}\right) \times \frac{6.5 \times 10^{-7} \times 1}{1 \times 10^{-3}}$$

$$= 1.63mm$$

13 **(c)**

According to Malus' law

$$I = I_0 \cos^2\theta\ = I_0\left(\cos^2 60°\right) = I_0 \times \left(\frac{1}{2}\right)^2 = \frac{I_0}{4}$$

14 **(d)**

The amplitude will be $A\cos 60° = A/2$

15 **(a)**

Oil floating on water looks coloured only when thickness of oil layer=wavelength of light= 10000Å

16 **(b)**

$$\frac{\Delta\lambda}{\lambda} = \frac{v}{c} \Rightarrow \frac{0.05}{100} = \frac{v}{3 \times 10^8} \Rightarrow v = 1.5 \times 10^5 m/s$$

(Since wavelength is decreasing, so star is coming closer)

17 **(b)**

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

18 **(c)**

$$\frac{I_1}{I_2} = \frac{a^2}{b^2} = \frac{9}{1}$$

$\therefore \quad \frac{a}{b} = \frac{3}{1}$

$$\frac{I_{max}}{I_{min}} = \frac{(a+b)^2}{(a-b)^2} = \left(\frac{3+1}{3-1}\right)^2 = 4:1$$

20 **(b)**

Distance $= \frac{2\lambda}{b} \times d$

$$= \frac{2 \times 0.5 \times 10^{-4}}{2} \times 100 = 0.5 \text{ mm}$$

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