DPP

DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 10

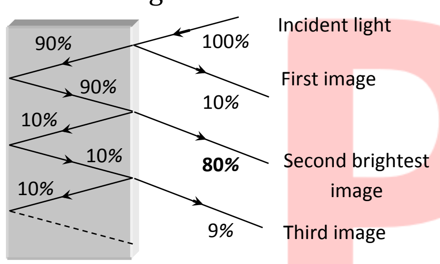
Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

1 **(c)**

$$\frac{f_l}{f_a} = \frac{{}_a\mu_g - 1}{{}_l\mu_g - 1} = \frac{{}_a\mu_g - 1}{\frac{{}_a\mu_g}{{}_a\mu_l} - 1} \Rightarrow \frac{f_1}{2} = \frac{1.5 - 1}{\frac{1.5}{1.25} - 1} \Rightarrow f_1 = 5cm$$

3 **(b)**

Several images will be formed but second image will be brightest



4 **(b)**

$$n = \frac{360°}{\theta} - 1$$

$$3 = \frac{360°}{\theta} - 1$$

$$\theta = 90°$$

5 **(a)**

For a microscope $|m| = \frac{v_o}{u_o} \times \frac{D}{u_e}$ and $L = v_o + u_e$

For a given microscope, with increase in L, u_e will increase and hence magnifying power (m) will decrease

6 **(d)**

$f = \frac{1}{(\mu - 1)}$ and $\mu \propto \frac{1}{\lambda}$. Hence $f \propto \lambda$ and $\lambda_r > \lambda_v$

8 **(a)**

$$D_F = \frac{d^2}{\lambda}$$

$$D_F = \frac{3 \times 10^{-3}(3 \times 10^{-3})}{500 \times 10^{-9}} = \frac{90}{5}\text{m} = 18\text{m}$$

9 **(b)**

When object is in rarer medium and observer is in denser medium.
Normal shift, $d=(n-1)h$
Where $h=$ real depth
Here, $h=y$
Now, apparent depth or the apparent height of the bird from the surface of the water
$=y+(n-1)y=ny$
The total distance of the bird as estimated by fish is $x+ny$.

10 **(a)**

$\mu=\frac{h}{h'}\Rightarrow h'=\frac{h}{n}$

11 **(d)**

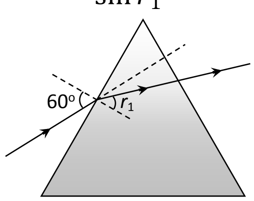
Given refracting angle of prism P
$A_P=3°$
And refractive index of prism P
$\mu_P=1.5$
And refractive index of prism Q
$\mu=1.6$
$(\mu_P-1)A_P=(\mu_0-1)A_Q$
$(1.5-1)3°=(1.6-1)A_Q$
Or $0.5\times 3=0.6\times A_Q$
Or $A_Q=\frac{0.5\times 3}{0.6}$
Or $A_Q=2.5°$

12 **(a)**

The communication using optical fibres is based on the principle of total internal reflection.

13 **(d)**

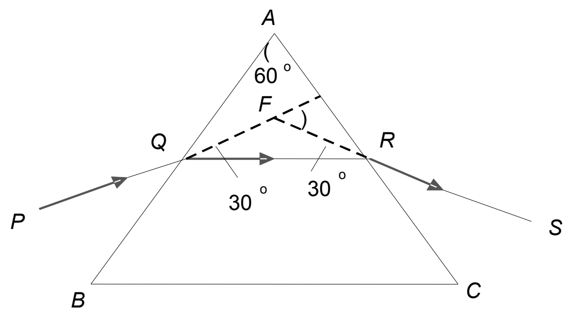
From figure it is clear that $\angle e=\angle r_2=0$
From $A=r_1+r_2\Rightarrow r_1=A=45°$
$\therefore\ \mu=\frac{\sin i}{\sin r_1}=\frac{\sin 60}{\sin 45}=\sqrt{\frac{3}{2}}$



Also from $i+e=A+\delta\Rightarrow 60+0=45+\delta\Rightarrow\delta=15°$

14 **(a)**

For a given prism, the angle of deviation depends upon the angel of incidence of the light rays falling on the prism
Taking triangle $F\ PQR$, we have
$S=\ \angle FQR+\angle FRQ$
Since, ΔAQR is an equilateral triangle, therefore,



$\angle FQR = \dfrac{60°}{2} = 30° = \angle FRQ$

$\therefore\ \delta = 30° + 30° = 60°$

Hence, angle of deviation of the ray is 60°.

15 **(d)**

Think in terms of rectangular hyperbola

16 **(b)**

For achromatic combination $\frac{f_1}{f_2} = -\frac{\omega_2}{\omega_1} = -\frac{0.036}{0.024} = -\frac{3}{2}$ and $\frac{1}{f_1} - \frac{1}{f_2} = \frac{1}{90}$

Solving above equations we get $f_1 = 30cm, f_2 = -45cm$

17 **(a)**

Magnifying power of a telescope having objective of focal length (f_0) and image distance (u_e) is

$M = -\dfrac{f_0}{u_e}$

To see with relaxed eye final image should be formed at infinity.

The distance between the objective and eyepiece is so adjusted the image is formed at the focus of the eyepiece.

Substituting $v_e = f_e$, we get

$|M| = \dfrac{f_0}{f_e} = \dfrac{F_1}{F_2}$

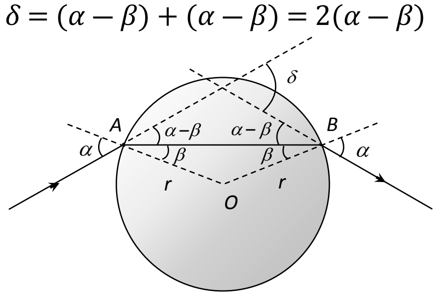
18 **(a)**

Incandescent electric lamp gives continuous emission spectrum. Mercury and sodium vapour lamp give line emission spectrum

19 **(b)**

From the following ray diagram it is clear that

$\delta = (\alpha - \beta) + (\alpha - \beta) = 2(\alpha - \beta)$



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