DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutio

Subject : PHYSICS
DPP No. : 2

Topic :- RAY OPTICS AND OPTICAL INSTRUMENTS

1 **(c)**
When the object is placed at the center of the glass sphere, the rays from the object fall normally on the surface of the sphere and emerge undeviated.

2 **(c)**
$\theta = (\mu_v - \mu_R)R = (1.6 - 1.5) \times 5 = 0.5°$

3 **(c)**
$c = \frac{x}{t_1}, v = \frac{10x}{t_2}$
$\sin C' = \frac{1}{\mu} = \frac{v}{c} = \frac{10x}{t_2} \times \frac{t_1}{x}$
$C' = \sin^{-1}\left(\frac{10\, t_1}{t_2}\right)$ ...(i)

4 **(d)**
$f = \frac{R}{2} \Rightarrow R = 40cm$

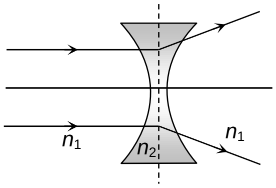
5 **(a)**
Radio, waves can pass through dust, clouds, fog, etc, in a radio, telescope. It can detect very faint radio signal due to enormous size of its reflection. So it can be used at night and even in cloudy weather

6 **(c)**
$\mu = 1 = 3\left(1 - \frac{1}{\mu}\right)$
Or $1 - \frac{1}{\mu} = \frac{1}{3}$ or $\frac{1}{\mu} = 1 - \frac{1}{3} = \frac{2}{3}$ or $\mu = \frac{2}{3}$
Now, $\frac{1}{\sin i_c} = \frac{3}{2}$
Or $\sin i_c = \frac{2}{3}$ or $i_c = \sin^{-1}\left(\frac{2}{3}\right)$
Or $i_c = \sin^{-1}(0.67)$

7 **(a)**
According to Cartesian sign convention
Object distance, $u = -15\ cm$
Focal length, $f = -10cm$
Using mirror formula $\frac{1}{u} + \frac{1}{v} = \frac{1}{f} \Rightarrow \frac{1}{(-15)} + \frac{1}{v} = \frac{1}{(-10)}$
$\frac{1}{v} = \frac{1}{(-10)} - \frac{1}{(-15)} + \frac{1}{(-10)} + \frac{1}{(15)}$ or $v = -30cm$
This image is 30 cm from the mirror on the same side of the object
Magnification, $m = -\frac{v}{u} = -\frac{(-30\ cm)}{(-15cm)} = -2cm$
The image is magnified, real and inverted

8 **(d)**
$\frac{1}{f} = \left(\frac{n_2}{n_1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ where n_2 and n_1 are the refractive indices of the material of the lens and of

the surroundings respectively. For a double concave lens, $\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$ is always negative



Hence f is negative only when $n_2 > n_1$

9 **(d)**

A concave lens always produces a virtual and erect image on the same side of the lens, which is smaller in size.

10 **(b)**

$f = -d = -100\ cm = -1\ m$

$\therefore P = \frac{1}{f} = \frac{1}{-1} = -1\ D$

11 **(a)**

$\frac{1}{f} = \left(\frac{n}{1}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

$\frac{1}{f_1} = \left(\frac{n}{n'}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

Dividing, $\frac{f_1}{f} = \frac{(n-1)n'}{n-n'}$

Or $f_1 = -\frac{fn'(n-1)}{n'-n}$

12 **(a)**

$\frac{f_l}{f_a} = \frac{{}_a\mu_g - 1}{{}_l\mu_g - 1} = \frac{1.5-1}{\frac{1.5}{1.75}-1} = -\frac{1.75\times 0.50}{0.25} = -3.5$

$\therefore f_l = -3.5\, f_a \Rightarrow f_l = +3.5R\ [\because f_a = R]$

Hence on immersing the lens in the liquid, it behaves as a converging lens of focal length 3.5 R

13 **(a)**

A camera is a device used to take pictures, either singly or in sequence. Camera's have a lens positioned in front of the camera's opening together the incoming light and to focus the image or part of the image on the recording surface. The size of aperture (its diameter) controls the brightness of the scene control and the amount of light that enters the camera during a period of time, and the shutter controls the length of time that the light hits the recording surface.
A diameter of an aperture is measured in f- stops. A lower f- stops number opens the aperture admits more light onto the camera sensor. Higher f – stop numbers make the cameras aperture smaller so less light hits the sensor.

14 **(c)**

Two plano-convex lens of focal length f, when combined will give rise to a convex lens of focal length $f/2$
The image will be of same size if object is placed at $2f$ $i.e.$, at a distance f from optical centre

16 **(d)**

Since ${}_a\mu_g = \sqrt{2}$, so ${}_g\mu_a = \frac{\sin i}{\sin r} = \frac{1}{\sqrt{2}}$

$\therefore \sin r = 1 \Rightarrow r = 90°$

17 **(b)**

Sodium light gives emission spectrum having two yellow lines

18 **(d)**

Length of image $=\left(\frac{f}{f-u}\right)b$

19 **(b)**

At the time of sunrise and sunset, the sun is near the horizon. The rays from the sun have to travel a larger part of the atmosphere. As $\lambda_b < \lambda_r$, and intensity of scattered light $\propto \frac{1}{\lambda^4}$, therefore, most of the blue light is scattered away, only red colour, which is least scattered enters our eyes and appears to come from the sun. Hence, the sun looks red both at the time of sunrise and sunset.

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