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HOMEWORK

$u = -45\,cm \qquad v = 90\,cm$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{90} + \frac{1}{45} = \frac{1}{30}$$

$$f = 30\,cm.$$

When the needle is moved 3cm away from the lens.

$$u = -(45+5) = -50\,cm$$

$$\therefore \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$$

$$= \frac{1}{30} - \frac{1}{50} = \frac{2}{150}$$

$$= v = 75\,cm.$$

Displacement of image $= v - v' = 25\,cm$ towards the lens

$$P = P_1 + P_2$$

$$= 3D + (-1.5D)$$

$$= +1.5D$$

It will be Convergent.

$$P = \frac{1}{f} \qquad 1.5 = \frac{1}{f} \qquad f = 0.66$$

(Q3).

Ans. Concave lens

$f = -25\,cm$

$P = -4D$

In Combination

$u = -20\,cm$

$m = \frac{-5}{1} = \frac{v}{u}$.

$\Rightarrow -5 \times -20 = v$

$\Rightarrow v = 100\,cm$

By lens formula,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$\Rightarrow \frac{1}{f} + \left(\frac{-1}{25}\right) = \frac{1}{100} - \left(\frac{-1}{20}\right)$

$\Rightarrow \frac{25 - f}{25f} = \frac{12}{2000}$

$\Rightarrow 25 \times 12 \times f = 200(25 - f)$

$\Rightarrow 300f = 5000 - 200f$

$\Rightarrow 500f = 5000$

$\Rightarrow f = 10\,cm$

Power $= \frac{1}{f}$

$\Rightarrow \frac{1}{f} = 10\,d$ (concave lens)

Q)

Ans:

i) $P = P_1 + P_2$

$= 10D - 5D = 5D$

$f = 20\ cm$

ii) $P = 10D - 20D$

$= -10D$

$f = \frac{100}{-10} = -10\ cm$

iii) $P = -5D$

$f = \frac{100}{-5} = -20\ cm$

iv) $P = 15D$

$f = \frac{100}{15} = \frac{20}{3}\ cm.$