Question

An upright object is placed at a distance of 40 cm in front of a convergent lens of focal length 20 cm. A convergent mirror of focal length 10 cm is placed at a distance of 60 cm on the other side of the lens. The position and size of the final image will be

A) 40 cm from the convergent mirror, same size as the object

B) 20 cm from the convergent mirror, same size as the object

C) 20 cm from the convergent mirror, twice the size as the object

D) 40 cm from the convergent mirror, twice the size as the object

Solution

Correct option is B)

There will be 3 phenomenon

(i) Refraction from lens

(ii) Reflection from mirror

(iii) Refraction from lens

After these phenomena. Image will be on object and will have same size.

None of the option depicts so this question is Bonus

1^{st} refraction $u = -40$ cm; $f = +20$ cm

$\Rightarrow v = +40$ cm(image I_1)

and $m_1 = -1$

for refraction

$u = -20$ cm; $f = -10$ cm

$\Rightarrow v = -20$ cm(image I_2)

and $m_2 = -1$

2^{nd}refraction

$u = -40$ cm; $f = +20$ cm

$\Rightarrow v = +40$ cm(image I_3)

and $m_3 = -1$

Total magnification $= m_1 \times m_2 \times m_3 = -1$

and final image is formed at distance 40 cm from convergent lens and is of same size as the object.