Q1. A myopic adult has a far point at 0.1 m. His power of accommodation is 4 D.

(i) What power lenses are required to see distant objects?

(ii) What is his near point without glasses?

(iii) What is his near point with glasses? (Take the image distance from the lens of the eye to the retina to be 2 cm.)

Ans: (i) Let the power at the far point be P_f for the normal relaxed eye of an average person. The required power

$P_f = 1/f = 1/0.1 + 1/0.02 = 60D$

By the corrective lens the object distance at the far point is ∞

The power required is

$P'_f = 1/f' = 1/\infty + 1/0.02 = 50D$

So for eye + lens system,

we have the sum of the eye and that of the glasses P_g

$\therefore P'_f = P_f + P_g$

$\therefore P_g = -10$ D

(ii) His power of accommodation is 4 D for the normal eye. Let the power of the normal eye for near vision be P_n.

Then, $4 = P_n - P_f$ or $P_n = 64$ D

Let his near point be x_n, then

$$1/x_n + 1/0.02 = 64 \text{ or } 1/x_n + 50 = 64$$

$$1/x_n = 14$$

$$\therefore \quad x_n = 1/14 = 0.07m$$

(iii) With glasses $P'_n = P'_f + 4 = 54$

$$54 = 1/x'_n + 1/0.02 = 1/x'_n + 50$$

$$1/x'_n = 4$$

$$\therefore \quad x'_n = 0.25m$$